Public Utilities

Volume 59 No. 13 June 20, 1957

INFLATION AND UTILITY FINANCING AND REGULATION
By Fergus J. McDiarmid

« »

The Future of Intraurban Suburban Transit
By Colonel Sidney H. Bingham, U. S. A. (Ret.)

« »

Who's Building What Dam?
By Kenneth McCord

« »

State Regulation of Atomic Energy

New compressor stations, like the one pictured above, are constantly being built to the steadily increasing demands for natural gas. These compressor stations pump natur through Columbia's 36,716 miles of pipeline to homes and industries in America's Hear

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serving homes and industry in America's Heartland

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Public Utilities FORTNIGHTLY

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ARTICLES

Inflation and Utility Financing and Regulation ..... *Fergus J. McDiarmid* 881
A carefully reasoned critique of the prevailing attitude towards rate making for electric and other utilities.

The Future of Intraurban Suburban Transit *Colonel Sidney H. Bingham, U. S. A. (Ret.)* 891
Suggested improvement in traffic analysis and forecasting of transit movement on a time and area basis, and new operating techniques.

Who's Building What Dam? ..... *Kenneth McCord* 899
A project-by-project description of the more local partnership programs that somehow do not get into the newspapers.

FEATURE SECTIONS

Washington and the Utilities 907
Telephone and Telegraph 911
Financial News and Comment ..... *Owen Ely* 914
What Others Think 923
State Regulation of Atomic Energy 923
Bell Science Programs Unique in Television 925
The March of Events 932
Progress of Regulation 937
Industrial Progress 21

• *Pages with the Editors* . 6 • *Utilities Almanack* 17
• *Coming in the Next Issue* 10 • *Frontispiece* 18
• *Remarkable Remarks* .. 12 • *Index to Advertisers* .. 34

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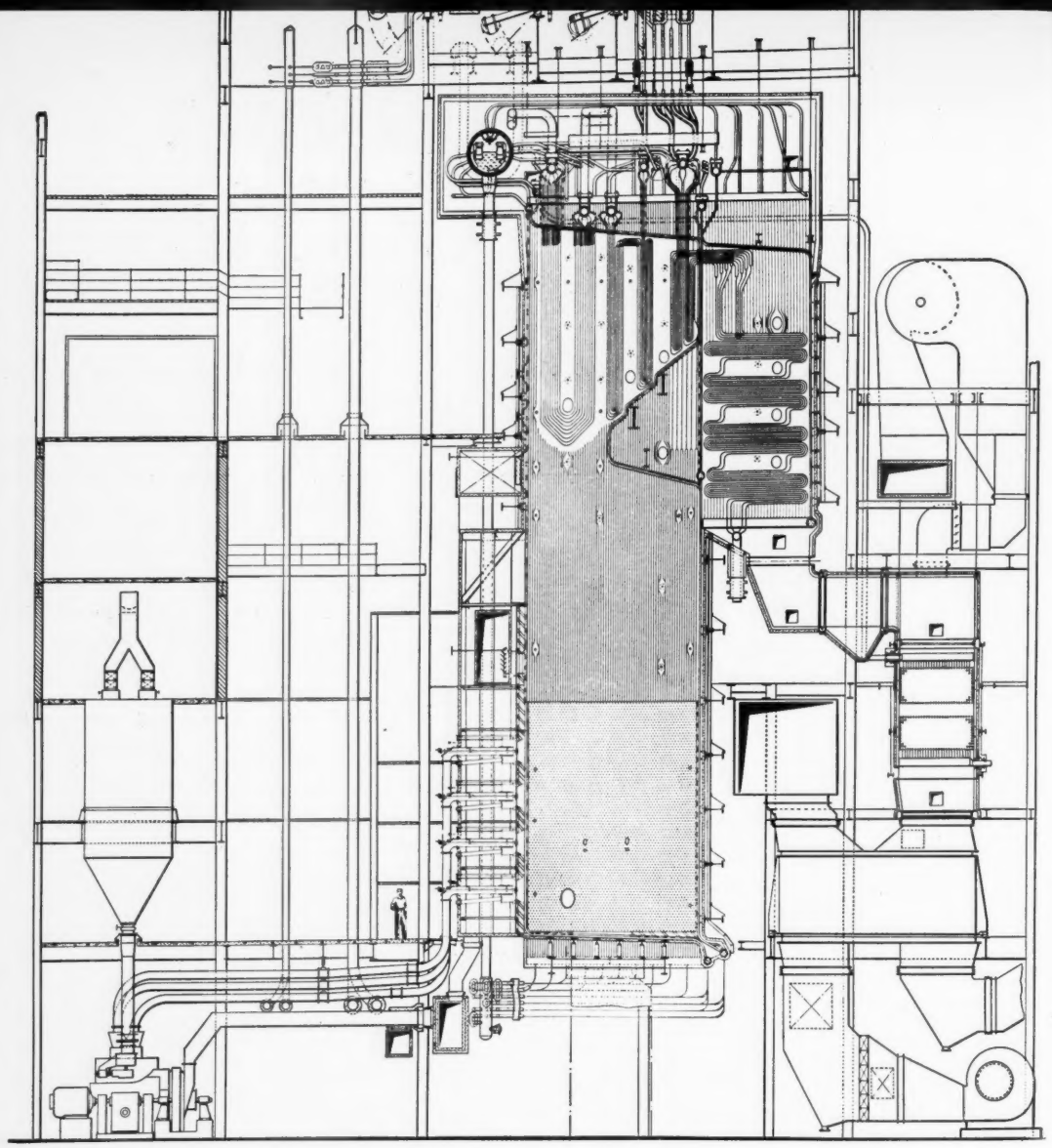

Latest unit for Burlington Station, Public Service Electric & Gas Company has a capacity of 1,350,000 lb of steam per hr. Comprehensive circulation tests on this unit, plus more than a year of sustained performance, proved that natural circulation boilers can operate easily with drum design pressures of 2800 psi, for throttle conditions over 2400 psi.

B&W NATURAL CIRCULATION BOILERS ABOVE 2600 PSI DESIGN PRESSURE

NAME OF UTILITY	STATION	NO. UNITS	DES. PRESS. psi	THROTTLE PRESS. psi	TOTAL TEMP. F	REHEAT TEMP. F	TOTAL KW
Indiana & Michigan Electric Co.	Twin Branch	1	2650	2335	940	900	76,500
Public Service Electric & Gas Co.	Burlington	1	2700	2350	1100	1050	200,000
Public Service Electric & Gas Co.	Linden	1	2700	2350	1100	1050	225,000
Southern California Edison Co.	Huntington Beach	2	2700	2400	1050	1000	400,000
Virginia Electric & Power Co.	Bremo	1	2700	2400	1000	1000	150,000
International General Electric Company	Chiba	1	2700	2400	1060	1010	175,000
Memphis Light, Gas & Water Div.	Thos. H. Allen	3	2825	2400	1053	1053	862,500
Detroit Edison Co.	St. Clair	1	2700	2400	1050	1000	325,000
Virginia Electric & Power Co.	Portsmouth	1	2700	2400	1000	1000	150,000
Southern California Edison Co.	Mandalay	2	2700	2400	1050	1000	400,000
Pacific Gas & Electric Co.	Pittsburg	2	2725	2400	1050	1000	660,000
TOTAL CAPACITY SERVED							3,624,000

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here's a reason why so many progressive utility mpanies and their engineers, thinking of turbine rottle conditions of 2400 psi, have turned to &W. It is the unique record of performance of &W high pressure natural circulation boilers.

mplicity of installation and operation has been rought to high pressure steam generation by B&W atural circulation boilers. They have lower oper- ing costs because no machinery requiring power nd maintenance is needed for circulation.

ng range operating experience—since 1939—as been gained with natural circulation high pres- ure boilers operating above 2000 psi. Operators' uccess with natural circulation boilers is due to the &W Cyclone Steam Separator, and a design which akes liberal use of outside downcomer capacity nd provides proper balance of makeup and riser ubes.

lean turbines are an extra plus value. Cyclone team Separators not only maintain good circula- ion, but, used with Steam Washers, they maintain xceptionally clean turbines. At one plant, where a B&W Radiant Boiler has been on the line constantly for a year, the turbine manufacturer reports that the turbine is the cleanest high pressure unit his engineers have ever seen. And tubes in the high duty part of the furnace are as clean internally as the day they were installed.

B&W first designed natural circulation boilers for operation at drum pressures over 2000 psi nearly 20 years ago. Today 86 B&W natural circulation boilers with these high design pressures are in operation and 52 more are being built.

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Pages with the Editors

IF anyone has an idea that inflation and the economic attrition caused by large-scale government spending and taxation are new phenomena, there is much historical evidence to convince him that this is not so. Coin clipping as a form of currency debasement by government fiat was noted as far back as the Roman Caesars and even mentioned by Gibbon in the *Decline and Fall of the Roman Empire.*

MORE recently the Princeton University Press (1952) has published an interesting book, entitled *The Theodosian Code and Novels and the Sirmondian Constitutions,* a translation with commentary, glossary, and bibliography by Clyde Pharr. This contains some astonishing historical references to currency devaluation and monetary inflation. It is a well-known fact, of course, that all prices tend to increase and the corresponding purchasing value of all currency tends to decrease over long periods of time. There never has been any national currency that actually increased in purchasing power over any appreciable time span.

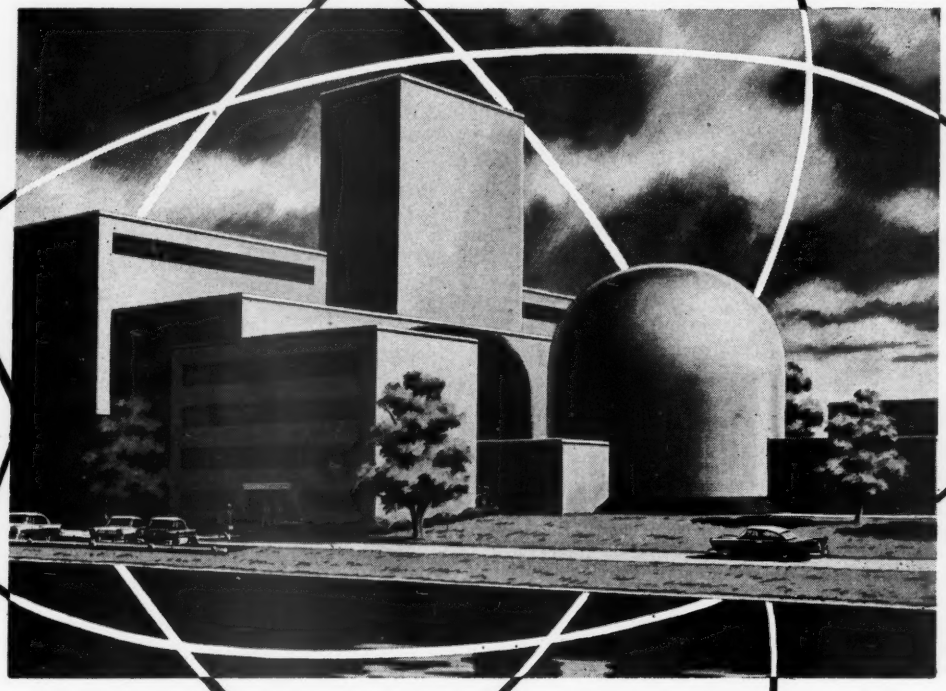
THIS is another way of saying that the stability of any currency in terms of purchasing power is a relative thing. During the past century or more the dollar and the pound sterling have been regarded as more stable than the franc or the lira, or some other monetary units which washed out entirely, such as the old reichsmark or Czarist ruble. But the pound and the dollar have only been stable in relation to these other currencies and not in relation to any substantial period of time.

SIDNEY H. BINGHAM

FERGUS J. MCDIARMID

ONE of the most remarkable things about dips or losses in purchasing power during wartime periods is the tendency for a victorious warring nation to stabilize or even recover some of the lost purchasing power of its currency during what might be called postwar periods of rectification. The American dollar recovered that way following inflationary dilution of its purchasing power during the Civil War and World War I. There was some expectation that it would likewise recover following World War II, but so far the evidence—perhaps aggravated by the Korean episode—points in the other direction.

THE leading article in this issue is a very persuasive analysis of the relationship of such periodical inflationary sprees to the stability of public utility financing. The author raises a rather disturbing ques-



ENRICO FERMI ATOMIC POWER PLANT

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KENNETH MCCORD

tion by referring to the so-called "built-in" protections, whereby our present national economy is supposed to avoid further serious economic depressions. Some depressions in the past have actually been part of the corrective process for restoring the purchasing power of the dollar following inflation. And if we are to have no more depressions, thanks to these "built-in" protective devices, such as minimum wages and other economic reforms which are supposed to stabilize our economy, it may turn out that the dollar can never recover purchasing power once lost, even for short periods.

IN other words, we may now have "built-in" inflation—an automatic inflationary process which will keep the dollar on the downgrade of purchasing power for an indefinite period. Nobody likes economic depressions. Certainly not of the kind experienced during the early thirties. But is there no limit to inflation which cannot be stopped or slowed down? Public utilities obviously have a deep concern for all such considerations of our national economic system.

THE author of this opening article on inflation and utility financing and regulation is FERGUS J. MCDIARMID, vice president in charge of investments, The Lincoln National Life Insurance Company of Fort Wayne, Indiana. MR. MCDIARMID does not write often, but when he does his contributions are invariably of the most thought-provoking type. A graduate of the University of Toronto ('28), he spent his early years in life insurance actuarial work, becoming a Fellow of the Actuarial Society of America and of the American Institute of Actuaries. He has made his career with The Lincoln National Life Insurance Company, starting to work for them three days after receiving his university degree.

* * * *

COLONEL SIDNEY H. BINGHAM, U.S.A. (Ret.), whose article on "The Future of Intraurban Suburban Transit" begins on page 891, is a nationally known consulting engineer on such matters and former chairman of the New York City Board of Transportation. He began his career in the transit industry in 1915 with the former Interborough Rapid Transit Company. After distinguished World War I service as a railroad engineer with the U. S. Army in France, COLONEL BINGHAM returned to the Interborough as a technical assistant to the president. At the outbreak of World War II he was commissioned as a Colonel with the Military Railway Service of the U. S. Army, to develop and carry out the design for the Normandy invasion. Since his return to civilian life, COLONEL BINGHAM has served on the New York City Board of Transportation, becoming its chairman in 1950. He recently resigned as general manager of the New York City Transit Authority to enter private consultant practice.

* * * *

IN his article beginning on page 899, KENNETH MCCORD of the public relations department of the Washington Water Power Company gives us an up-to-date account of dam building in the Pacific Northwest. Actually, there are power dams and big ones being built. This author has checked on all of them and gives us a project-by-project description of the more local partnership programs.

THE next number of this magazine will be out July 4th.

The Editors

In actual road tests . . .

Dodge won top honors in test after test between comparable models of all three low-priced trucks. Special high-speed camera records actual finish of hill-climb test. From a standing start, test crews raced all three trucks up a 32% grade. Dodge was *first* by five lengths.

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How about it? Don't you think you should find out for yourself? Just give your Dodge dealer a ring. He'll bring a truck right to your door and he'll show you certified test results that demonstrate Dodge is a winner in actual tests and on your job.

DODGE

PowerGiants

MOST POWER OF THE LOW-PRICED 3

Coming IN THE NEXT ISSUE

(July 4, 1957, issue)

★

FURTHER ASPECTS OF FAIR RATE OF RETURN

Most of us are aware of the precipitous rise in the cost of debt capital of utilities which has occurred in recent months. The tightening money market, with increased cost of all forms of debt capital, is a factor which is giving increasing concern and apprehension not only to the utility management but regulatory agencies as well. William H. Howe, chief engineer of the Arizona Corporation Commission, discusses what is necessary to provide in fixing the rate of return for debt service, as well as stock dividends, of electric utilities and other forms of electric utility enterprise.

POSTDISASTER CONTINUITY OF UTILITY MANAGEMENT

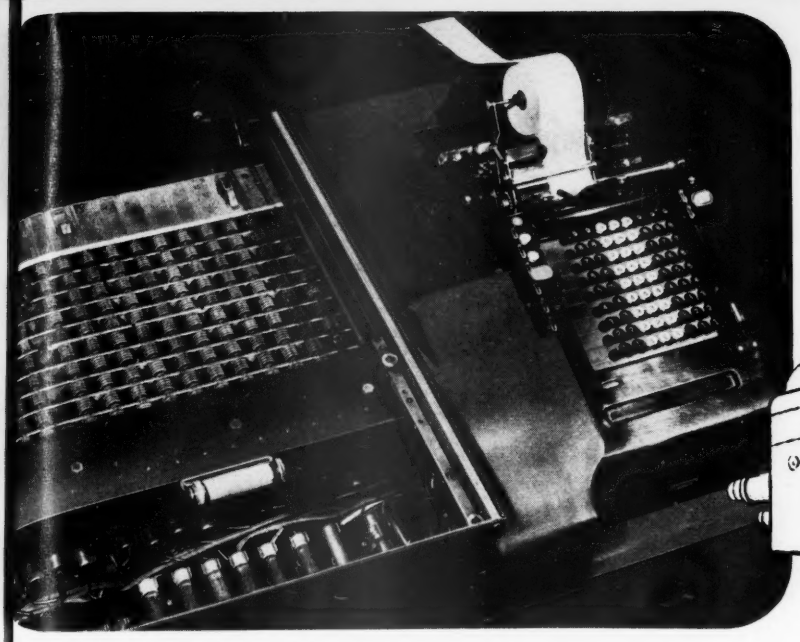
With all this talk of an atom bomb attack and other kinds of catastrophic emergencies, how are utilities organized to carry on following such devastating experiences? Ralph V. H. Wood, director of the defense department of the Philadelphia Electric Company, discusses the plans that can be made for the postdisaster continuity of public utility operations. The protection and assembly of management, the re-establishment of lines of authority and operating supervision are considered in a practical and objective way.

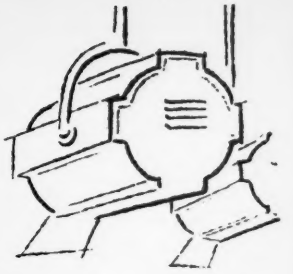
THE TAXPAYER SUBSIDIZES GOVERNMENT POWER PROJECTS

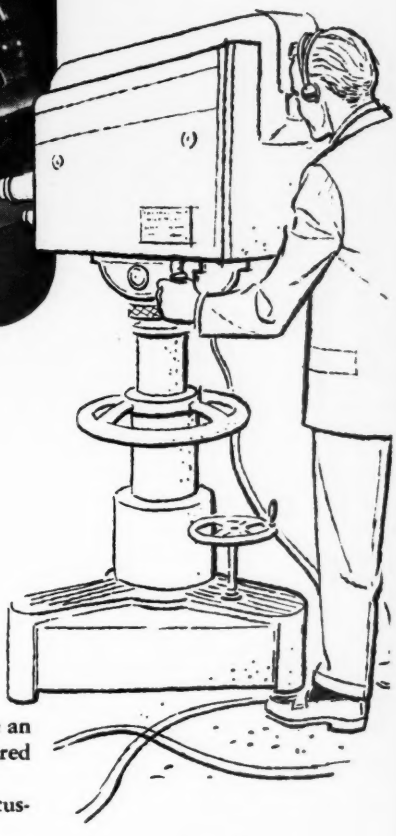
Since TVA is the most publicized federal project of its kind, and since it is engaged in a variety of activities, including flood control, navigation improvement, etc., an analysis of TVA operations might be regarded as a measurement to some extent of all federal power operations. Ernest R. Abrams, well-known writer of business articles, has approached this analysis from the standpoint of answering such questions as whether TVA is a "bankable" proposition, whether it is paying its way, and, if not, to what extent it is subsidized. This sort of article has been done often before, but Mr. Abrams takes an original slant and also answers some of the claims made as to the tremendous economic benefits of government power projects.

★

Also . . . ***Special financial news, digests, and interpretations of court and commission decisions, general news happenings, reviews, Washington gossip, and other features of interest to public utility regulators, companies, executives, financial experts, employees, investors, and others.***







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Remarkable Remarks

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—MONTAIGNE

BISHOP FULTON J. SHEEN

"Socialism is a system which grows in direct ratio and proportion to the surrender of individual responsibility. When the state gives us what we have, it will not be long until the state owns what we are."

SINCLAIR WEEKS
Secretary of Commerce.

"[The population growth now at 170 million is amazing. It provided a] fresh stream of talent and skills to build a better America. I am happy to welcome this vast throng of new customers for America's goods and services. They help insure a rising standard of living and reflect our prosperous times."

M. S. RUKEYSER
Columnist.

". . . . the individual, in this self-governing Republic, can also simultaneously contribute to the anti-inflationary campaign . . . as a citizen and a voter. In this public rôle, the citizen, individually and collectively, can serve notice on members of Congress, of state legislatures, and of municipal bodies, to go easy in governmental spending."

EDITORIAL STATEMENT
The Wall Street Journal.

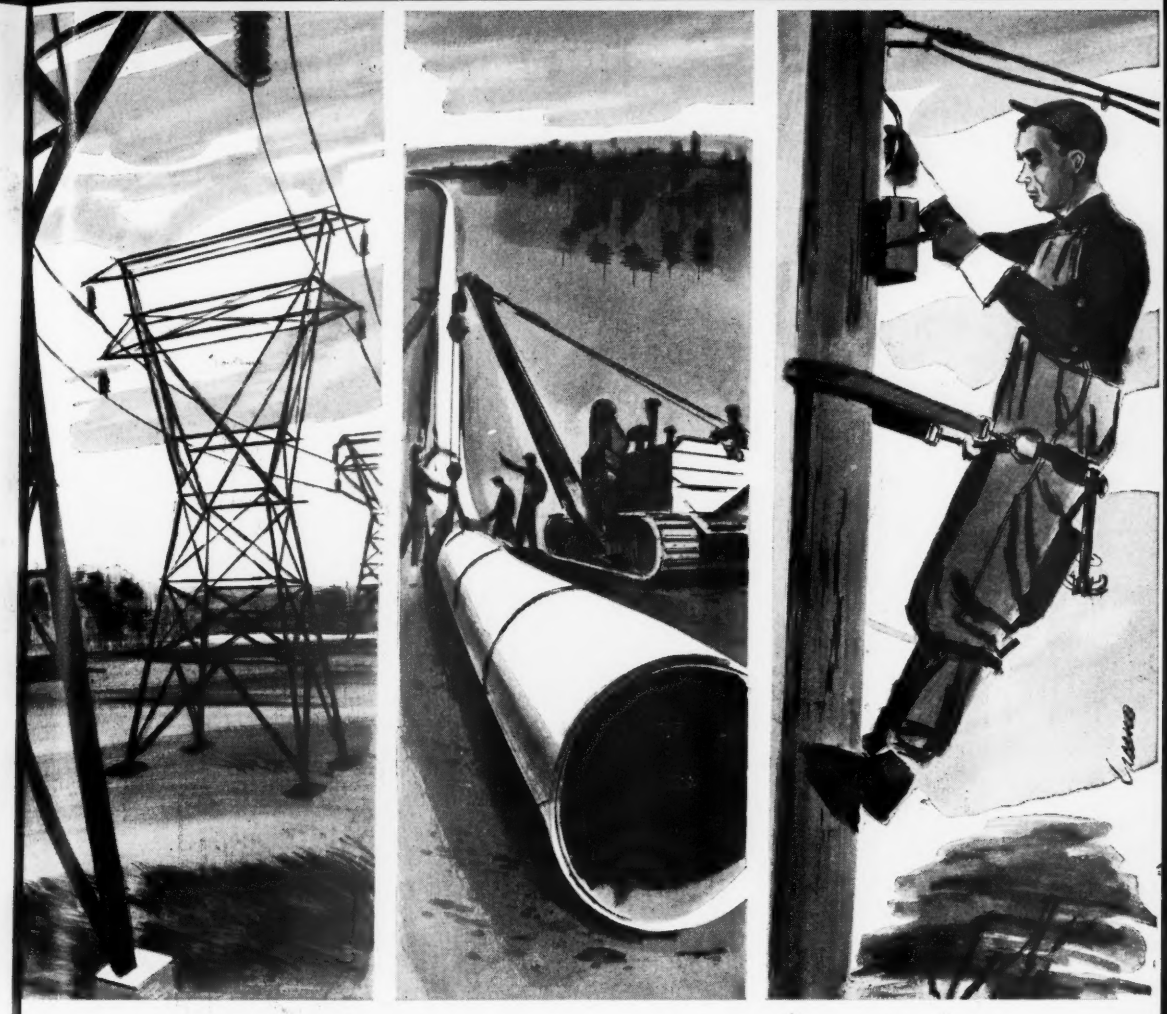
"By its nature, big government is unwieldy. The systems follow an entrenched design and it is difficult to get them out of the ruts. On the average, for example, government writes a billion letters every year to itself and to the public at a cost of $1 each. A great many of these letters could be eliminated by eliminating the reports the letters concern."

E. M. NAUGHTON
President and general manager, Utah Power & Light Company.

"It is just as true today as it was a century and a half ago, that the condition under which God has given liberty to men is eternal vigilance. Whether the demagogues advocating public power are or are not Socialists is not important. What is important is that the price we pay for public power must also be measured by the advance of Socialism in our midst and our loss of liberty."

HARRY F. BYRD
U. S. Senator from Virginia.

". . . at the present time we are actually taking from the people in cash each year 110 billions of dollars—by that I mean the federal government and the Social Security and the state and local governments. We are taking $110 billion out of a total national income of $335 billion, which is 33 per cent. I make the prediction—I do not know when we will tell whether it's correct or not—that it is impossible for this great private enterprise system of ours to continue for a long period of time when 33 per cent of the earnings of the people are taken for taxes in cash each year. So that's a very serious situation."



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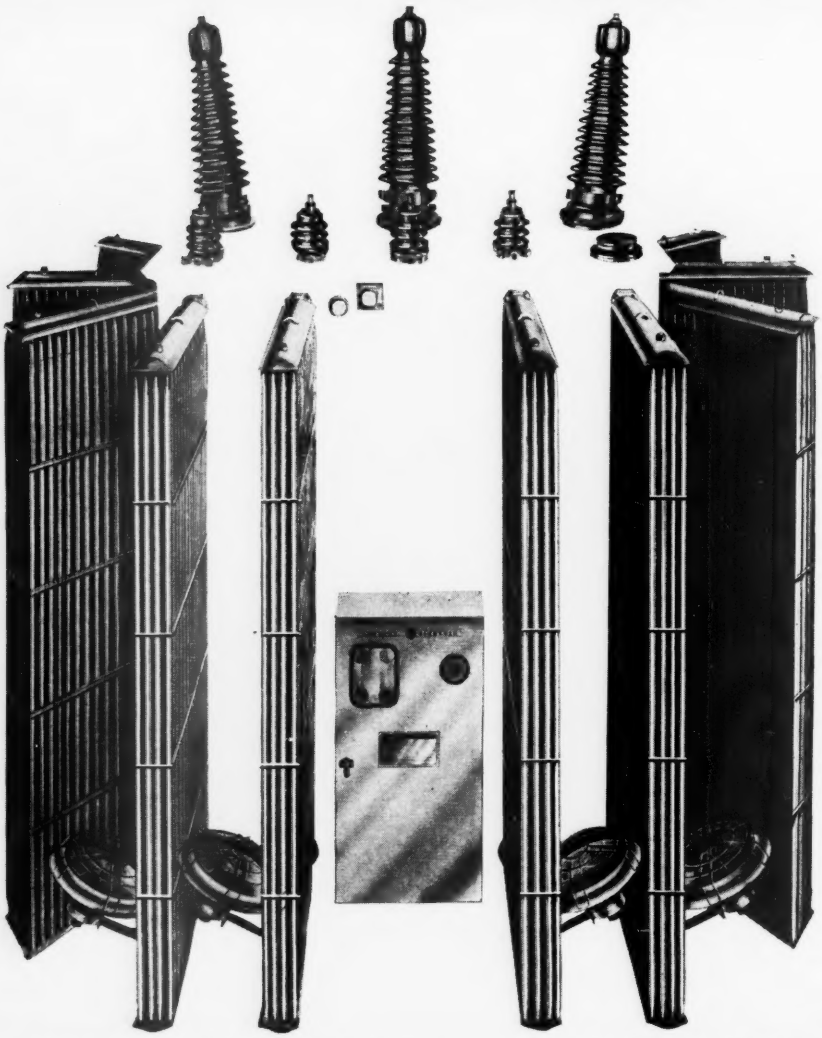

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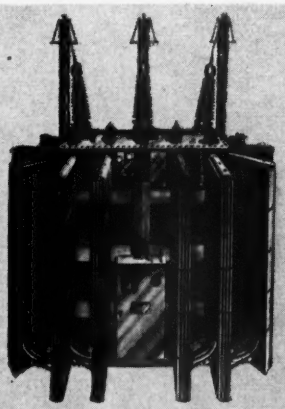

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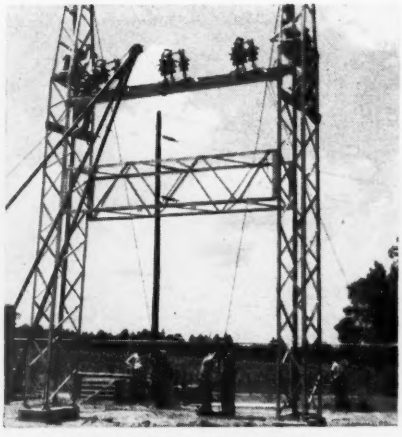

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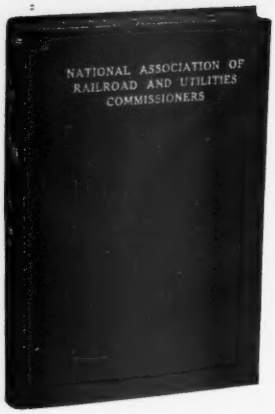

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NATIONAL ASSOCIATION OF RAILROAD AND UTILITIES COMMISSIONERS

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UTILITIES
A·l·m·a·n·a·c·k

JUNE-JULY

Thursday—20 *Northwest Electric Light and Power Association, Accounting and Business Practice Section, begins annual conference, Sun Valley, Ida.*	**Friday—21** *American Society for Testing Materials ends 6-day annual meeting, Atlantic City, N. J.*	**Saturday—22** *Institute of Gas Technology will hold natural gas fuel utilization summer session, Chicago Ill. July 8-26.* **Advance notice.**	**Sunday—23** *Michigan Electric Association begins meeting, Mackinac Island, Mich.*
Monday—24 *American Society of Heating and Air Conditioning Engineers begins semi-annual meeting, Murray Bay, Quebec, Canada.*	**Tuesday—25** *Wisconsin Utilities Association, Accounting Section, ends 3-day annual convention, Land o'Lakes, Wis.*	**Wednesday—26** *American Bar Association will hold annual meeting, London, England. July 11-16.* **Advance notice.**	**Thursday—27** *Canadian Gas Association ends 4-day meeting, Jasper, Alberta, Canada.*
Friday—28 *Advertising Association of the West ends 5-day annual convention, Honolulu, Hawaii.*	**Saturday—29** *University of Michigan Engineering Summer Conferences will be held, Ann Arbor, Mich. Aug. 19-30.* **Advance notice.**	**Sunday—30** *Western Electronic Show and Convention will be held, San Francisco, Cal. Aug. 20-23.* **Advance notice.**	**JULY** **Monday—1** *American Institute of Electrical Engineers will hold Pacific general meeting, Yakima, Wash. Aug. 26-30.* **Advance notice.**
Tuesday—2 *Pacific Coast Gas Association will hold annual convention, San Francisco, Cal. Sept. 3-5.* **Advance notice.**	**Wednesday—3** *New Jersey Gas Association will hold annual meeting, Spring Lake, N. J. Sept. 6.* **Advance notice.**	**Thursday—4** *Independent Natural Gas Association of America will hold annual meeting, Houston, Tex. Sept. 9, 10.* **Advance notice.**	**Friday—5** *American Water Works Association, New York Section, will hold annual meeting, Upper Saranac Lake, N. Y. Sept. 11-13.* **Advance notice.**

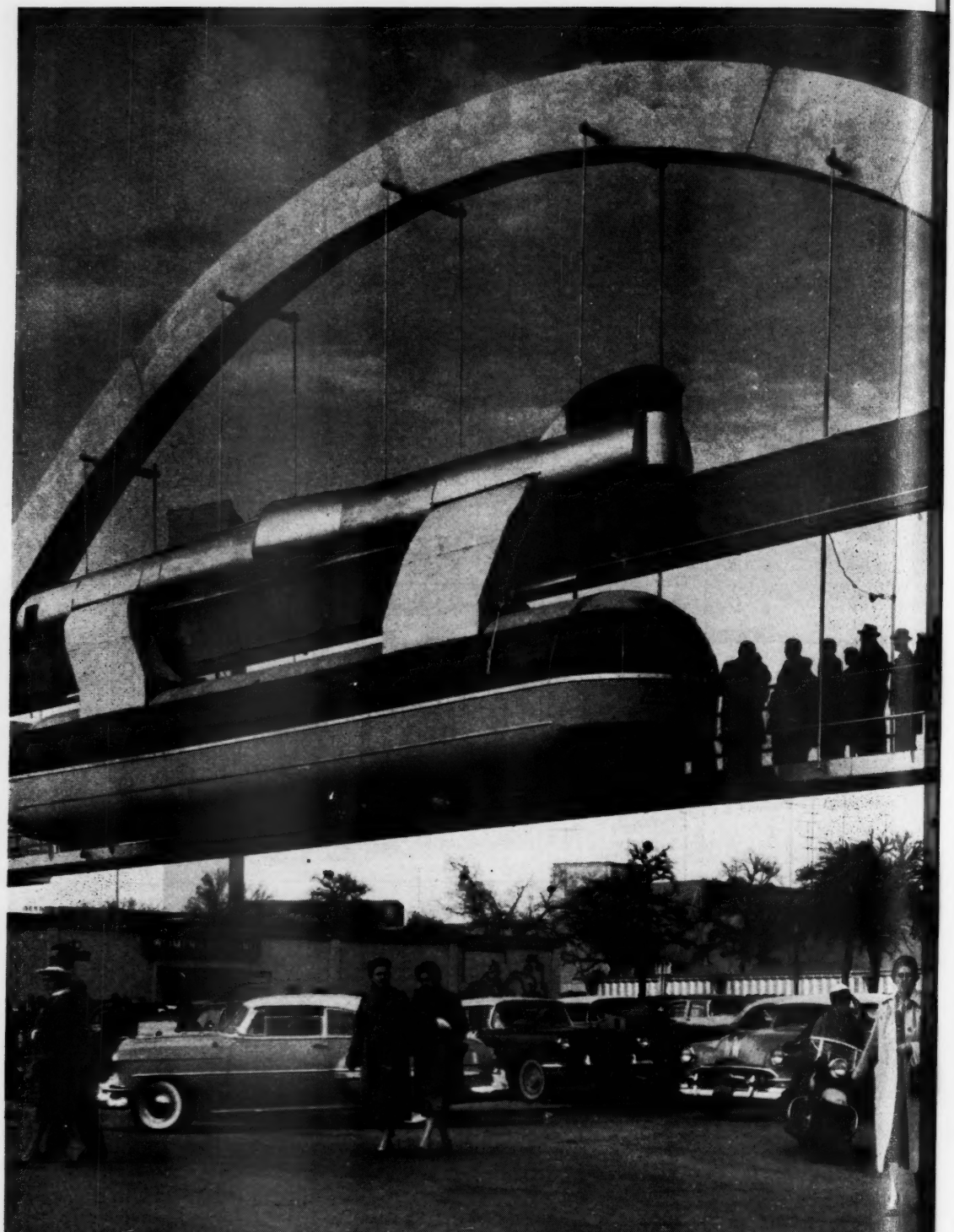


Photo by Squire-Haskins, Dallas, Texas

Monorail—Mass Transit Vehicle of the Future?

(See article beginning on page 891.)

Public Utilities
FORTNIGHTLY

VOL. 59, NO. 13 JUNE 20, 1957

Inflation and Utility Financing And Regulation

A very carefully reasoned critique of the prevailing attitude towards rate making for electric and other utilities by regulatory authorities. Inflation is held responsible for unfair results of regulation, based on original cost and the presumption of a stable dollar.

BY FERGUS J. McDIARMID*

WE live in an era which has a strong bias toward inflation, and a continuing decline in the real value of our dollar is the probability for the foreseeable future. As this becomes increasingly apparent, the supply of savings willing to seek investment in fixed dollar securities, bonds, mortgages, and preferred stocks will tend to diminish. These factors are likely to have a serious effect on the ability of the public utilities to meet their capital requirements in the years ahead. Also, under these conditions, the strict adherence to original cost valuation for ratemaking purposes is a confiscatory process and likely to impede the flow of capital into the utility industry.

THESE were the central ideas expressed in an article of mine published in the PUBLIC UTILITIES FORTNIGHTLY in

* Vice president in charge of security investments, The Lincoln National Life Insurance Company, Fort Wayne, Indiana. For additional personal note, see "Pages with the Editors."

March, 1952.[1] Thereafter, as if to give the lie to my thesis, we proceeded to have about four years of relatively stable money value. However, since early 1956, the inflationary trend has again emerged, and my article of early 1952 now appears as good as the day it was written—in fact, a little better, as some of the predictions made therein have come true.

My reasons, at that time, for expecting a continuance of inflation may be summarized here, as they have been reinforced by subsequent events:

1. We live in a disorderly world, necessitating huge government budgets, swollen principally by expenditures on armaments, which are nonproductive. The economic burden of policing the world has fallen to an increasing extent on this country, and no reversal of this trend is in sight.

2. The strength and militancy of labor unions have led to a wage price spiral in which wage increases tend to outrun increases in productivity. In fact, throughout large areas of industry, substantial hourly increases in wages, coupled with costly increases in fringe benefits, are now regarded as a normal annual event. Price increases inevitably follow.

3. Economic pressure groups are an inflationary force, increasing both prices and government spending. Farm price supports are a well-recognized example. Other pressure groups oppose the use of such fiscal weapons as higher interest rates as a means of combating inflation.

4. In former times, periodic unemployment served as a corrective to economic unbalance and was a deflationary influence. This is no longer regarded as permissible, and full employment at all times is the declared government policy. A famous economist has expressed the opinion that you cannot have at one and the same time full employment, highly organized labor, and stable money.

With respect to all of the above points, our present period of history is in sharp contrast with the only period on record when the modern world experienced relatively stable money, which was the century from 1815 to 1914. In that period, we had a relatively peaceful world, low government budgets, and a *laissez-faire* economy in which the recognized economic responsibility of governments was strictly limited. In the years 1911 to 1915, the expenditures of our federal government averaged $720 million annually, of which $333 million was for the Army and Navy, $165 million was for veterans' pensions, and $222 million covered everything else.

In my opinion, the only material factors pulling against the inflationary trend today are increasing productivity and competition. It is unlikely that these alone are sufficient to do the job. Based on what we know of history, coin clipping, rather than stable money value, has been the long-term pattern established by the human race.

Events Since 1952

In the 1952 article, I stated that the cheap money era seemed to be about over. This was partly due to the surmise that the supply of savings willing to go to work in fixed dollar media would be less than the demand. This was not a very dar-

[1] "Utility Finance and Regulation in an Age of Inflation," by Fergus J. McDiarmid, Vol. XLIX, No. 7, March 27, 1952, p. 399.

ing prophecy, to be sure, but events were fairly prompt in confirming it.

The short sharp rise in interest rates in mid-1953 culminated in very stringent money market conditions in June of that year. This was followed by a decline in interest rates. These rates began to rise again in 1955, and they rose dramatically in the fall of 1956. Since that time, they have fluctuated in a fairly narrow range, with a heavy demand for funds and continuing inflationary pressure tending to support them.

Also pulling in the same direction is a distinct leveling off in the type of savings seeking investment in taxable bonds. The largest savings institutions and the largest purchasers of taxable bonds in recent decades have been the life insurance companies. At the end of 1954, which is the last date at which I have been able to assemble statistics, the life insurance companies held between 60 per cent and 65 per cent of the bonds of all private utilities, including electric, gas, telephone, and water companies.

ACCORDING to data assembled by the Life Insurance Association of America, the assets of United States life insurance companies increased $5,953,000,000 in 1954, $5,946,000,000 in 1955, and only $5,718,000,000 in 1956, thus interrupting the ascending growth curve of two decades. This turndown in asset increase took place in spite of continuing growth in the volume of new insurance written. Apparently, an increasing part of the new business was in group and term form, which involves little asset accumulation. It took place in a period when the demand for life insurance funds from utilities, home builders, and others was increasing rapidly. It is interesting to note that, in 1956, the net percentage return on life company assets increased, on average, .12 per cent because of higher interest rates on new investments. However, in that year, the great bulk of these assets lost about 3 per cent of their real value due to inflation.

What thoughts can now be set down which were not apparent, or at least too clear, five years ago? In 1952, I think many of us held to the hope, however tenuous, that our money might regain some of its lost value. In this hope, we had history on our side. By 1879, four years after the end of the Civil War, our dollar had largely regained the purchasing power lost during that struggle and was again freely convertible into gold. Between 1920 and 1929, our dollar regained about 30 per cent of the value which it

LOSS IN VALUE OF U. S. DOLLAR BASED ON CONSUMER PRICE INDEX OF U. S. DEPARTMENT OF LABOR

	Total Loss In Period	*Annual Compounded Rate of Loss*
1941 to January, 1957 (16 years)	47%	4%
Wartime 1941-45 (4 years)	18%	5⅛%
Immediate Postwar 1945-48 (3 years)	25%	10%
Stable Period 1948-50 (2 years)	No Loss or Gain	0%
Korean War Period 1950-53 (3 years)	10%	3⅜%
Eisenhower 1st Term 1953-Jan., 1956 (3 years)	No Loss or Gain	0%
Jan., 1956-Jan., 1957 (1 year)	3%	3%

lost during World War I and its aftermath, as measured by the Cost of Living Index of the United States Department of Labor. In the years following, it regained still more value. Many people felt that, after World War II, this process might be repeated. In 1952, this hope still persisted. Now it is practically dead.

Instead, prices now seem to operate on a kind of ratchet system—they can go up but are not permitted to go down. The way the ratchet has worked is graphically illustrated in the table on page 883.

We see here that periods of stability have been interspersed with periods of declining value in the dollar. However, there have been no periods in which the value of the dollar gained perceptibly. Whether or not the current loss trend has spent itself is as yet unknown. It continued strong at least through March. The recent federal budget is not an auspicious sign. I believe the vast wave of frustration, shock, and resentment with which this budget, the work of a Republican administration, was greeted arose largely from the belief that it set the seal on continuing inflation.

Inflationary Trend Widely Accepted

A HIGHLY disturbing development of the past five years has been the increasing belief among business and industrial leaders that further inflation, if not inevitable, is at least highly probable. Illustrative of this belief is a quotation from a recent bond prospectus. In December, 1956, the city of Memphis sold $141 million of electric revenue bonds to finance a new electric power plant and related facilities. The prospectus offering these bonds made reference to the need of selling additional series of bonds in the future to finance additional generating units. I quote directly from the prospectus in this regard:

> The estimated amount of each of the additional series of bonds and the approximate date of sale of each series as presently planned is as follows:
>
> | *Approximate Amount Of the Bond Issue* | *Approximate Date Of Sale* |
> |---|---|
> | $36,500,000 | July, 1959 |
> | 41,000,000 | July, 1961 |
> | 45,000,000 | July, 1963 |
>
> The size of the units proposed to be installed in 1959, 1961, and 1963 is identical (250,000 kilowatts name-plate rating), but *the estimated cost per unit has been escalated to cover expected increased costs in materials and labor.*
>
> The italics are mine.

HERE, in connection with the sale of a large block of securities with principal and interest payable in a fixed number of dollars, was a candid admission by the sellers that the dollar is expected to lose value, and at a rather rapid rate. Based on their own estimates, it will take 23 per cent more dollars to finance a 250,000-kilowatt generating unit in 1963 than in 1959. The engineers probably meant to be conservative in their estimates, but they employed a train of thought which has become very widespread in business and management circles today.

Based on the available evidence, it would seem that we may look forward to periods of relative price stability interspersed with periods of moderate inflation. There may be also included periods of slight price deflation, although these are not likely to be significant. This, of course, assumes no world catastrophe. If we can hold ourselves to an average loss

The Rights of the Investor

"A good many regulatory authorities feel it their duty to insist that all utility bonds sold be made callable immediately at modest premiums. Duty to whom? Surely, the investor who still has the hardihood to buy bonds and preferred stocks in a period when the dollar tends to lose value is entitled to retain, for an extended period at least, such fixed dollar return as he is able to negotiate. To deny him this is to increasingly channel his funds in some other direction and to force the borrower involved to pay a higher current cost for money than would otherwise be necessary."

in money value not exceeding 1 per cent a year, we may regard this as a relative victory for anti-inflationary forces, although not for holders of annuities and fixed dollar securities. Under the circumstances, a 4½ per cent bond would provide a real return of 3½ per cent, with the other 1 per cent representing a return of capital which will be taxable. It is unlikely that such a slow rate of inflation, with the tight money intervals necessary to maintain it, would have the blessing of Mr. Patman or the National Association of Home Builders.

Impact on Utility Financing

What does all this imply for the public utility industry in so far as the capital markets are concerned and also with respect to rates and regulation?

With respect to their senior capital requirements, the utilities will be competing for a limited and not very expansive supply of savings willing to go to work for a fixed dollar return. Growing inflationary fears can only tend to contract the supply of such savings, and any attempt by governmental authorities to artificially expand available funds can only feed the fires of inflation. Interest rates will, therefore, probably continue at levels generally higher than they have been in the last twenty-five years. The present level of such rates may be regarded as a return to normalcy.

In 1956, capital expenditures of all seg-

ments of the utility industry were about $7.5 billion, and the trend from this level is more likely to be up than down. Capital expenditures of the electric utility industry alone, over the next ten years, have been estimated to average over $4 billion a year and, thereafter, higher amounts. These estimates, no doubt, presuppose a stable dollar. Under such circumstances, unless we can encourage savings in fixed dollar forms, and that means restraining inflation, a real scarcity of senior capital is likely to develop, such as already exists elsewhere in the world.

FLUCTUATIONS in interest rates, in the future, will probably be much wider than during the last few decades. It is to be expected that inflationary surges will be combated with periods of tight money, which will be sharply relaxed the moment the first faint glimmer of deflation occurs. Under such circumstances, investors will attempt to protect, as they have every right to do, the higher rates they are able to negotiate in relatively tight money periods.

The utilities may have to face the fact that, in times to come, equity securities may have an appeal to many investors that is quite lacking in bonds and preferred stocks. The trend in this direction is shown by the fact that, seven or eight years ago, a cross section of electric utility common stocks yielded over twice as much as the bonds of the same companies. Today, the common stocks do not yield a great deal more than the new issues of bonds and may even yield less than newly issued preferred stocks of the same companies. If the supply of fixed dollar investment capital becomes increasingly inadequate, increased financing by the sale of common stocks and retained earnings may be necessary.

Also, if interest rates are to fluctuate more widely than in the past, a more flexible policy of utility financing may be in order, selling bonds and preferred stocks in lower interest periods and common stocks when interest rates are high, without too rigid adherence to a preconceived set of capitalization ratios.

About Utility Rates

UTILITY services are the product of materials and labor; and, therefore, utility rates must move with other prices. Some types of services, such as telephone and water, already have felt the full impact of price inflation and have had to adjust rates accordingly, sometimes at a slower pace than the circumstances warranted.

In the case of electric utilities, the economics of the industry, including rapid load growth and higher generating efficiency, have, so far, enabled the companies in this field to hold rate increases to a minimum. This fortunate situation will probably not continue much longer in the face of further inflation. The improvement in efficiency between generating equipment installed in the 1920's and that installed in the late 1940's and 1950's was very great. Installations in the 1930's and the war period were small. Further improvement will probably be at a slower pace. Capital costs, both in terms of dollars invested and in the rate of return required to attract such dollars, will probably increase.

There may be a tendency on the part of some utility managements to sit back and wait for something to turn up to obviate the need for rate increases, even after the

handwriting is already on the wall. Such a lethargic or temporizing attitude will do the industry no good in a period when capital is free to pick and choose its field of employment.

Higher Rates of Return Needed

THE higher cost of capital, in a period when real savings are falling far short of demand, cannot help but have an impact on the permissible rate of return, if the utilities are to be able to attract the capital they need in a free market. After all, a rate of return suitable when bond money cost 3 per cent and preferred stock money 4 per cent is not suitable in a period when both of these costs are 1½ per cent higher. As for the idea that we will average out, that the present represents a peak level of interest rates from which we are likely to return to much lower rates, the whole argument of this article is to the contrary. It is now pretty generally recognized that interest rates high enough to encourage savings, and which tend to ration capital to its most essential uses, are a necessary curb to inflation. And inflation, coupled with a shortage of real savings in relation to demand, is likely to remain the supreme economic problem of our era, just as unemployment was thought to be in an earlier period.

Some regulatory bodies have, apparently, seen the light in this respect. The California commission has traditionally been considered one of the strictest in the country. A recent decision of that commission,[2] handed down early this year, recognized the need for higher rates of return, and it also recognized, by inference, that current inflationary factors are operating to continuously depress the rates of return earned.

I quote from that decision:

> The present condition of the money market calls for revision of rates of return that might have been fair and reasonable when adequate funds at lower interest rates were available. The ultimate consumers receive a full measure of benefit from applicant's operations and applicant is entitled to rates which yield it a fair and reasonable return. Taking into consideration all of the facts and special circumstances brought out in this record, we are of the opinion and find that a fair and reasonable rate of return to applicant at the present time is 6.5 per cent. However, if rates just sufficient to produce a rate of return of 6.5 per cent were to be authorized herein, such rate of return would not be realized in 1957 because the au-

[2] Re Pacific Lighting & Gas Supply Co. Decision No. 54465, Application No. 37553, January 29, 1957, 18 PUR3d —.

¶ "INFLATION *is a robber and a destroyer of civilizations. Historians say that, during the third century* A.D., *inflation did much to undermine the power and vitality of Roman civilization. It can do the same to ours. The purpose of this article is not to condone inflation or to infer that the disease can be lived with comfortably, but, rather, by taking a cold-blooded view of present trends and where they are likely to lead, to throw some weight, however limited, into the scales against it.*"

thorized rates will not be in effect for the full year. In view of this fact, and the declining tendency in rate of return, rates will be authorized which would produce a rate of return of 6.9 per cent, the return requested by applicant, and which reasonably may be expected to produce for the future a rate of return not in excess of that herein found reasonable.

We can only hope that this enlightened and realistic point of view spreads and that utility managements elsewhere will do their part in spreading it. They should realize that capital has great mobility, seeks out those jurisdictions where regulation is reasonable and fair to investors, and tends to shun less enlightened jurisdictions. For the foreseeable future, capital will probably be in a position to choose its field of employment.

Investors Demand Call Protection

UNDER today's conditions, there is one requirement that is uppermost in the mind of any buyer of senior securities, bonds, and preferred stocks. That is adequate call protection. He has experienced the painful effect of being whipsawed in the past. Bonds sold in the relatively high interest market of 1953 were called rapidly thereafter and replaced with lower-yielding bonds. The purchaser of such bonds is determined not to let it happen again if he can help it. He is aware that interest rates, in the future, are likely to fluctuate widely and does not want to see the interest rate on his portfolio periodically reduced to that prevailing in the troughs of the waves. Modest call premiums provide no adequate compensation.

A good many regulatory authorities feel it their duty to insist that all utility bonds sold be made callable immediately at modest premiums. Duty to whom? Surely, the investor who still has the hardihood to buy bonds and preferred stocks in a period when the dollar tends to lose value is entitled to retain, for an extended period at least, such fixed dollar return as he is able to negotiate. To deny him this is to increasingly channel his funds in some other direction and to force the borrower involved to pay a higher current cost for money than would otherwise be necessary. Most informed institutional investors today, who are the normal buyers of utility bonds and preferred stocks, tend to demand that these securities be made noncallable for refunding for a reasonable part of their term. A 10-year period of noncallability through refunding is a normal request.

Original Cost Outdated by Inflation

IN 1952, I expressed the view that the valuation of utility properties for rate-making purposes, strictly on an original cost basis, was unsuitable in an era of inflation. Subsequent events have confirmed this point of view. Original cost valuation presupposes a relatively stable dollar, the value of which tends to go up as well as down.

Even supposing that, in the future, utilities can continue to attract a major part of outside capital requirements through the sale of fixed dollar media, that part raised in the form of common stock equity will represent funds which, to a greater or lesser extent, are seeking protection from the effects of inflation. If they cannot find this in the utility industry, they will probably find it elsewhere.

It is not suggested that rate making,

strictly on the basis of reproduction value, is required as long as the industry is able to raise a large part of its capital in fixed dollar securities. However, rate making which looks only to original cost will increasingly cause investor discrimination against utilities operating under such jurisdictions. In a period with a strong bias toward inflation, an open mind and at least a middle way are essential.

Impact on Depreciation Policy

DURING an era of rising prices, such as the present, depreciation charges, based upon the original cost of property, tend to be inadequate. It follows that when such charges are insufficient to replace property at the end of its useful life, stated earnings tend to be greater than real earnings. This matter is particularly important to the public utility industry, because nearly all of the invested capital of that industry is in the form of long-life property.

Inflation, therefore, has a long time in which to undermine the real value of depreciation accruals. Also, these accruals are an important element in utility operating statements, being not entirely different in order of magnitude from net earnings. Couple this with the fact that utility earnings are strictly regulated, and you have a potentially dangerous and confiscatory situation.

Let us consider a highly simplified example—an investment of $100 in a piece of property having a useful life of thirty years and valueless at the end of that period. On the basis of straight-line depreciation, operating on original cost, a depreciation accrual of $3.33 would be made annually.

However, in the event of inflation, the following table illustrates the problem which would arise:

Annual Compounded Decrease in Dollar Value Assumed	*Replacement Cost after 30 Years*	*Annual Depreciation Required to Replace*
0%	$100	$3.33
1	135	4.49
2	181	6.04

THE results for annual rates of inflation above 2 per cent were not included, as they were too devastating. An annual inflation rate of 1 per cent produces a depreciation deficiency, based on the usual accounting methods, of 1.16 per cent of property value annually and a corresponding reduction in the real rate of return earned. A 2 per cent annual inflation rate increases this deficiency to 2.71 per cent and would have the effect of reducing a stated 6 per cent rate of return to a real rate of 3.29 per cent. Under present methods of depreciation accounting, assuming the continuance of inflation, it will be necessary for a utility to plough back earnings, or raise new capital on the outside, just to maintain a fixed amount of physical property in being.

The impact of inflation on depreciation requirements of public utilities and the resultant effect on real earnings have not yet received from regulatory bodies, or possibly from utility managements, the attention which they deserve. The federal tax collector would have to adjust his methods of allowing depreciation to the realities of inflation before anything really effective is likely to be done. Probably no other industry has as much at stake in this regard. Under present conditions, retained earnings, after dividends, must be viewed in part as supplementary depreciation accruals. In fact, if inflation continues at a

sufficiently rapid pace, and 2 per cent a year would be rapid enough, a normal pay-out of 70 per cent of stated earnings available for the common stock would represent a pay-out in excess of all real earnings in many cases.

In Closing

FROM a speech delivered in March, Professor Sumner Slichter, well-known Harvard economist, is quoted as follows:

> Hence, I fear that we shall probably have to live for some time to come in a world in which the price level is slowly rising most of the time. The principal comfort that I can offer is that this kind of world is not as bad as many very distinguished economists would have you believe. There will be no galloping inflation, no runaway prices, no frenzy of speculation, and no great collapse. Rather, our world will be one in which markets will be large and expanding, in which technology will be changing rapidly, in which competition will be extremely keen and profits fairly modest, a world in which bondholders will fare rather badly, in which the proportion of the national product going to the stockholders will continue to drop slowly, and in which most of the gains of increasing productivity will be to the employees.

I am afraid that I cannot quite share all of the professor's optimism. For one thing, progress and expansion depend on savings, and will a satisfactory rate of savings be maintained in a free society in the face of steady, even if slow, erosion of the currency unit? Also, I really doubt whether inflation can be held indefinitely to a slow pace, once its inevitability becomes widely accepted. If the bondholder fares badly enough for long enough, will he continue to buy bonds?

INFLATION is a robber and a destroyer of civilizations. Historians say that, during the third century A.D., inflation did much to undermine the power and vitality of Roman civilization. It can do the same to ours. The purpose of this article is not to condone inflation or to infer that the disease can be lived with comfortably, but, rather, by taking a cold-blooded view of present trends and where they are likely to lead, to throw some weight, however limited, into the scales against it.

"THE *free enterprise system, within a relatively short span of 160 years, has brought us from the impotency of 13 ununited colonies to our present position of world leadership. The American system has developed individual freedoms under constitutional democracy to the fullest measure ever known to man. It is the system that supplies the incentive to every American to start at the bottom and rise to the top. It has enabled us, with only 6 per cent of the world population, to outproduce the rest of the world combined.*

"It is no exaggeration to say that there's little or nothing on earth more important than the preservation of the fiscal integrity of the federal government of the United States of America and the freedoms upon which our Republic is founded."

—HARRY F. BYRD,
U. S. Senator from Virginia.

The Future of Intraurban Suburban Transit

Recognizing that mass transportation is the only alternative of continued municipal growth, this article deals with the alternatives of supporting mass transportation on a stand-by basis or developing it to the status of a full-time indispensable service with necessary restriction on private vehicular traffic.

By Colonel SIDNEY H. BINGHAM, U.S.A. (Ret.)*

It has now become a generally accepted fact that the transit situation as it affects our large centers of population today so verges on the critical that prompt remedial action is essential. Any further extended delay will only serve to promote the advent of impending traffic chaos.

A study of man's social and economic development shows quite clearly the almost dominant rôle the means of transportation played in his realization of betterments, advantages, and comforts — in brief, a fuller and more meaningful way of life.

By a process of evolution our means of transportation have developed according to needs, as a trail, a river, a footpath, a lane, a sidewalk, a road, a turnpike. These media were utilized by pedestrians, crude boats, and crude horse-drawn conveyances. Each of these avenues of travel created in turn the need for improved facilities. The trail which led to a camp site, the footpath or river to a settlement, the rough road to a village, stabilized the nomadic instinct and brought about centers of population, each developing its own transportation needs.

The resulting complexities of a developing social system brought the means of transportation more and more into focus with realities. The necessities of life had to be brought to the villages by means of transportation inherited from antiquity: the pack animal, the crude cart, the downriver float, oar-propelled boats, and the

* Consultant, New York, New York. For additional personal note, see "Pages with the Editors."

small crude sailing ship unable to tack; thus, the villages grew into cities.

NECESSITY being the mother of invention, the growing need was met with sailing ships of ever-increasing capacity that could tack and sail beyond sight of land with the aid of navigational devices. Four-wheeled wagons and coaches with pivoted front axles and improved harness rigs added greater utility and mobility to the means of transport and travel.

Transportation was of this form and type until the first part of the nineteenth century brought the steamboat and the steam locomotive. With the Bessemer process of making cheap steel in 1856, the "industrial era" was under way.

This new era of growth and expansion generated then, as it is generating today, the need for ever-improving transit facilities.

Various inventions in the field of transportation followed and the significance of each must be measured in relation to the changes it brought about in the existing transportation system. The introduction of steam was revolutionary, rendering obsolete the existing system. Its impact, however, was national rather than regional or urban. The means of rapid transit in these areas, with the exception of the New York elevated and the London underground, were not affected until later; in the meantime, the horse-drawn streetcar and bus ruled surface transit.

THE inventions which followed the introduction of electric power as a means of propulsion, revolutionized the system of rapid transit conveyance to a degree of significance almost equal to that following the introduction of the steam engine in the broader field of land and marine transportation.

The transportation inventions of yesterday, of necessity, brought about great changes in the urban areas which they affected, just as they do today. Undeveloped areas are made use of, and the character of older areas changes. Unfortunately, in most instances, these new systems of transportation have helped to develop the congestion due to concentrations of population and the growth which the improved transportation facilities encouraged. These trends remain unchanged, resulting in ever-increasing areas of traffic congestion.

The term "urban" is a definition associated with past territorial development resulting from the locational advantages found to exist in a particular area or site. Such growth ultimately developed into a town or city—a closely knit residential and commercial unit.

The later expansions into the adjacent land areas and the specialized development of each were largely influenced by tradition and this fact has greatly affected the type and over-all worth of the transit facilities which evolved. Generally, these were localized and followed no over-all operational pattern planned for the convenience or utilitarian needs of the community as a whole.

EVEN today the approach to the transit problems facing the urban-suburban communities is constrained due to the influence of tradition on its aspects and thus adversely influences the formulation of appropriate remedies.

Therefore, the first, the important step to be taken into consideration where the future of intraurban suburban transit is concerned, must be an improvement in

the methods employed in traffic analysis which will combine a forecasting of movement on a time and area basis, coupled with the appraisal of developing trends in population shifts and realignments based upon changing industrial or regional conditions in component areas. Such a systematic and searching examination will lay the foundation upon which a comprehensive and co-ordinated transit system can be built to provide optimum service.

A factor profoundly influencing the development pattern of urban-suburban areas is the automobile.

The impact of this vehicle of transportation on the nation's living and working habits has been so great that movements to decentralize functional areas of the urban complex and relocate them elsewhere are under way in many cities.

THEORETICALLY, decentralization may be a fine idea. People with more room in which to live and plan, factories on large accessible sites close to their workers present an alluring picture. But, practically, it poses many problems. The older central sections of cities from which the outward movement takes place are usually the most valuable areas, the sources of the greatest tax revenue. Their decline creates a financial problem and unless they are rebuilt they create slum problems.

The peripheral and suburban areas where the growth is taking place require the expenditure of large sums to provide facilities for the new population—streets, parks, schools, hospitals, sewers, water, and other services that people need. And the transportation problem will persist and may become even more difficult. With our mobile population and work force, few individuals live close to their jobs. Transportation to the job is either by automobile which requires highways and parking space or by a mass transit system which finds it increasingly difficult to serve a more sparsely populated area at a low fare.

Decentralization, even if it were possible and desirable, which it is not, is not the answer, at least not within the visible future. Additional highways alone are not the solution to our traffic problem. The transportation problem in our cities today requires a more comprehensive approach which recognizes the interdependence of existing transit systems. With the increasing and unrestricted flow of automobiles, the greatest need for parking space is in the most congested part of our cities.

It is impossible in our cities today to provide sufficient highway and parking

¶ "IT *has now become a generally accepted fact that the transit situation as it affects our large centers of population today so verges on the critical that prompt remedial action is essential. Any further extended delay will only serve to promote the advent of impending traffic chaos. A study of man's social and economic development shows quite clearly the almost dominant rôle the means of transportation played in his realization of betterments, advantages, and comforts—in brief, a fuller and more meaningful way of life.*"

space for everyone who would like to drive downtown. It is essential, however, to get people to and from their jobs and highly desirable for them to get downtown for other purposes. We must, therefore, find ways and means of getting them there.

Mass transportation is the only alternative.

Despite unparalleled population growth of metropolitan centers and unprecedented high levels of employment, traffic on mass transit systems has steadily declined since about 1947.

This decline has been brought about in part by the almost universal adoption of the five-day week, by longer vacations, more liberal sick leave provisions in industry, television keeping people at home, and similar factors.

But a major factor has been the shift of travel to automobiles. Increasing costs, common to all industries accompanying a declining passenger load, have put the transportation industry in a difficult position. Fare increases have helped even though generally they have been too late. But increasing the fares resulted in additional loss of passengers over and above the secular trend. It would seem that the point of diminishing returns from increasing fares is being approached and perhaps has been reached on some properties.

To complicate the problem the loss of transit riding has not been evenly distributed. The loss has been greatest in the nonrush hours. It has, therefore, been impossible to pare operating expenses to keep pace with the decline in traffic.

In some respects, then, mass transit has come to be a stand-by service—used to full capacity for about four hours—two hours in the morning and two in the evening—five days a week and during periods of inclement weather when people are reluctant to, or cannot, use their cars.

Despite the decline in transit traffic, there will always be a large population of riders for whom mass transit must be provided. For these people and for the business dependent on them, mass transportation is absolutely essential.

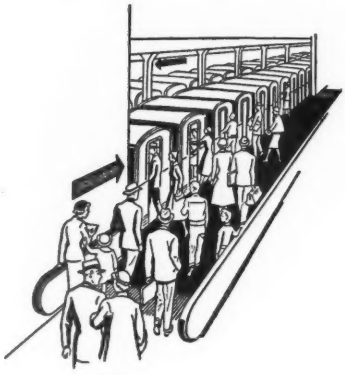
Mass transit must, therefore, be encouraged and aided by all the forces of government and society to serve the riders and to relieve the traffic problem.

Every avenue to maximize the use of transit systems must be explored. Such proposals as zone fares to encourage short-haul riding and lower fares in nonrush hours must be studied and tested.

One obvious way to maximize use of transit and solve the traffic problems would be to bar unessential private cars from the congested areas of the city. This, however, would be politically impossible and practically undesirable.

But the same result can be achieved indirectly to a substantial extent. The enforcement of existing parking regulations would go a long way in this direction. Insistence that new buildings make provision for off-street loading and unloading areas and the construction of additional parking garages would help. The provision of large low-cost parking fields outside the central area and adjacent to rapid transit stations and other transit facilities would be of the greatest help.

The improvement of transit equipment is necessary. The transit rider can never be given the same comfort and door-to-door service offered by a private car under the best conditions. But with



Transit Experiments

"In the mass transportation industry experimentation and technological advances must be encouraged to develop new and better facilities to improve the service offered and to reduce cost of operation. A medium of transportation which holds out great promise for many cities with transportation problems in which conventional subway construction is not feasible or cannot be financed is the newly developed monorail system which is in operation in Dallas, Texas. It is an entirely new concept of intraurban suburban rapid transit."

parking difficulties, door-to-door service is rarely available today. The transit system can offer greater speed in many cases and lower cost most of the time.

In the mass transportation industry experimentation and technological advances must be encouraged to develop new and better facilities to improve the service offered and to reduce cost of operation.

A medium of transportation which holds out great promise for many cities with transportation problems in which conventional subway construction is not feasible or cannot be financed is the newly developed monorail system which is in operation in Dallas, Texas. It is an entirely new concept of intraurban suburban rapid transit. The device illustrated in the frontispiece shows a monorail station of the Dallas pilot system.

The rail, a steel pipe 30 inches in diameter, is fastened to inverted "J"-shaped towers 30 feet high. Specially designed for high speeds the towers can be constructed to any height. The rail is designed with the center of gravity below the carrying point, which permits high speeds with safety. Passengers are carried overhead between stations but are brought to ground level for loading and unloading.

The coach, especially designed for this monorail and the only one of its kind in the world, is attractive and has many

new unusual features. It is 55 feet long, 7 feet wide, and 8 feet high. It seats sixty and can easily provide standing room for fifty or more. It has a fiberglas skin with plexiglas windows around the sides. There are four hydraulically operated doors which are spaced to allow for quick passenger flow. The coach can be emptied or filled in thirty seconds.

On top of the coach and riding above the rail are the engines, control equipment, and driver's seat. The operator sits inside a dome-shaped cabin. The coach now in service is powered by two 310-horsepower engines, but diesel or electric power can be supplied in full-scale operations. The entire unit rides on eight wheels with pneumatic tires while 16 rubber guide wheels hold it in place on the rail. In case of a blowout there are auxiliary steel wheels which can be brought into use. The noise inside the coach is no more than that heard inside a modern elevator. Weight of the coach is approximately 26,700 pounds. This is about 400 pounds per passenger and compares with 1,000 pounds per passenger on a bus and 2,000 pounds per passenger for railroad coaches.

Most interesting for operators endeavoring to solve their transportation problems is the fact that it is estimated a full-scale line can be constructed for approximately $500,000 a single track mile and at the rate of one or two miles a week as compared with conventional elevated and subway construction costs of from $6 million to $12 million a mile.This system operates overhead with stations at ground level. It can operate on one level and underground for intercity or central operations and it can be used over any type terrain. It can cross valleys and rivers and can be used for short specialized trips, long intercity travel, or for speedy nonstop commuter service.

This monorail system embodies the very latest in engineering and scientific know-how. Everything has been done to make it entirely safe. Locking wheels and locking guide rails make it impossible for the coach to leave the track. Brakes are automatic electric and the coach includes the "dead man control" braking which stops it instantly if the operator's hands leave the controls. It is equipped with the type of automatic fire extinguishers installed in airliners.

Operation has proved that suspended monorail can be not only the most comfortable ride providing an entirely new sensation in riding but also the most economical form of mass transit yet devised.

Commuter and rapid transit services are absolutely essential in a large metropolitan area. But there is little chance of their ever getting out of the red ink class with conventional equipment, plant, and thinking.

This new, modern monorail system, however, is economical to build and operate. It is fast, efficient, and comfortable. The operations in Houston and Dallas, Texas, have proved that it is entirely practicable.

With this more attractive type of service now available, it is possible for mainline railroads to sell their commuter-line rights of way to the turnpike authorities. They, in turn, could use them for needed new highways with a modern monorail transit system overhead. In that way, everyone would benefit: The automobile drivers would have more roads; the commuters would gain a superior service; and

the railroads could rid themselves of their hopelessly unprofitable commuter operations.

A second modern innovation of merit for future use in meeting certain transit requirements is found in the "Passenger Carveyor," a specialized development of the conveyor belt principle. This system has the attractive features of continuous operation, high passenger carrying capacity, and low space requirements added to low cost of construction and low operating costs due to its automatic features.

TODAY, after eight years of study and research, there has been constructed on a small scale, but large enough to carry passengers, a passenger conveyor which the writer has developed together with the engineers of the Goodyear Tire & Rubber Company and the Stephens-Adamson Manufacturing Company. A passenger conveyor system was developed that could accommodate more than 12,000 passengers per hour in each direction with present subway standards of safety and provide a fast, comfortable, and convenient ride.

The carveyor system differs from previous passenger conveyor proposals in that the passengers would ride in cars carried on conveyor belts and on banks of rubber-tired wheels.

As proposed for replacement of the Times Square-Grand Central Terminal shuttle service in the New York city subway, passengers at stations would walk onto moving loading belts having a speed of about one and one-half miles an hour. The car-loading belt would operate parallel to these belts and move at the same rate of speed. A number of small cars, each carrying ten to fifteen passengers, would move on this loading belt. Nineteen cars would pass the loading area every minute.

Passengers would step from the loading belt into a car which is empty as it arrives at the loading area and is moving at the same speed as the loading belt. The doors would open automatically as the cars reach the loading area and then slowly close prior to the time the cars clear the loading area.

Once clear of the loading area, the passenger cars would be rolled over a bank of rubber-tired accelerator wheels, gradually stepping up their speed to 15 miles an hour with acceleration at the comfortable rate of two and three-quarter miles per hour per second.

AT the other station the passenger cars would be slowed down at the same rate of speed over a bank of rubber-tired decelerator wheels and delivered onto the car unloading belt.

The empty car would then be carried

¶ "THE *downtown traffic congestion is a problem which concerns the greater metropolitan area and requires a co-ordinated study of all media of transportation recognizing the interdependence of all. The important thing to point out, however, is the need to plan along generous lines and to provide adequate facilities not only for the demands of the near future but the probable travel demands of twenty years from now.*"

around a loop at the end of the shuttle system on a bank of wheels and deposited on the car-loading belt ready to carry another load of passengers. The method of operation is shown in the device illustrated in the frontispiece.

DURING the many months of exhaustive engineering to perfect the conveyor belt subway plan, full-scale testing equipment was constructed to solve human element problems.

A rubber conveyor belt 60 feet long and nine feet wide and a mock-up of five full-size cars were set up for human engineering. The cars operated adjacent to the belt, duplicating actual loading and unloading conditions on the New York city subway belt system.

These test installations proved the workability of the subway belt system. Hundreds of tests were made with all kinds of people: old and young, nimble and lame, carrying packages and leading children, with not one mishap.

The downtown traffic congestion is a problem which concerns the greater metropolitan area and requires a co-ordinated study of all media of transportation recognizing the interdependence of all.

The important thing to point out, however, is the need to plan along generous lines and to provide adequate facilities not only for the demands of the near future but the probable travel demands of twenty years from now.

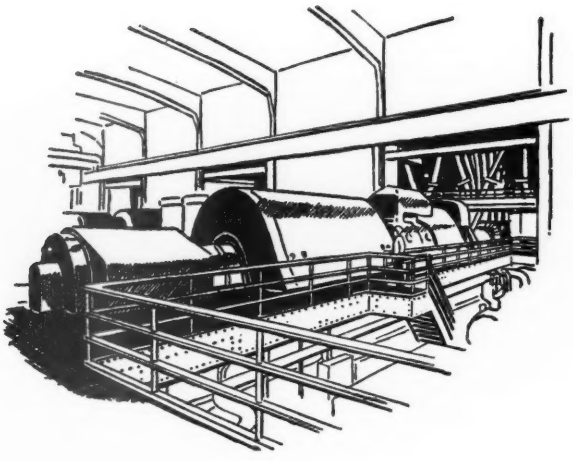
GREAT progress has been made in this age through engineering. Opportunities for those in the engineering profession are as good, if not better, than ever before. The engineer with a fresh view of the problem, using the broadest possible approach to its solution, has the best chance of coming up with the right answer.

"CAPITAL *and labor, despite family disputes as to distribution of the proceeds of gross sales, have a community of interest in creating public favor toward the city or region in which they operate. Capital, when invested in buildings, real estate, and heavy machinery, is committed to the place of its choice, with relatively little mobility.*

"While theoretically workers are free to move from place to place, they are in fact more or less tied down by home ownership, habits of friendship and nonbusiness affiliations, such as with a church or social club, and by a desire not to interrupt continuity of school relationships of their children. Thus the ties of both capital and labor to the place where they are located are for all practical purposes close.

"Yet in collective bargaining sessions, there is a tendency for both sides to concentrate on the immediate issues without much regard for the secondary and tertiary effects of their conduct and their decisions."

—M. S. RUKEYSER,
Columnist.



Who's Building What Dam?

This author has checked on power dam building in the Pacific Northwest area and gives us a project-by-project description of the more local partnership programs that somehow do not get into the newspapers because they are proceeding quietly and efficiently.

By KENNETH McCORD*

Out in the Pacific Northwest everyone is talking about a power shortage which could have a drastic effect on the economy of the area within a very few years. Newspapers throughout the nation are being flooded with clever propaganda by public power organizations saying that only quick action by the federal government and a network of all-federal dams, complete with the preference clause, can save the area. These same people are accusing the private power companies who pioneered electrical distribution in the Northwest of opposing any public power development or expansion.

The Northwest Public Power Association, the National Hells Canyon Association, the Washington Public Utility District Association, the Washington and Oregon state granges, and the National Rural Electric Co-operative Association are all opposing any power dam construction by a single private utility or by any group of utilities. They are claiming that the partnership program is designed to give private power companies control of the area's economic development and that construction of such projects as Mountain Sheep and Pleasant Valley dams on the Snake river between Idaho and Oregon would give these companies some sort of monopoly of power distribution in the

* Publicity assistant, Washington Water Power Company, Spokane, Washington. For additional personal note, see "Pages with the Editors."

area. They make this ridiculous charge in spite of the fact that federal and local public agencies are now generating 70.1 per cent of the power in the Pacific Northwest.

In the meantime, power dams, big ones, are being built. Two public utility districts are going ahead with dam building plans. Grant County Public Utility District is starting construction of Priest Rapids dam and it also plans to follow it with Wanapum dam a few miles upstream from the Priest Rapids site. The Chelan County Public Utility District recently issued $23.1 million in bonds to start construction of Rocky Reach dam. Let's take a look at these two projects and see just what made their early construction possible.

On November 4, 1955, the Federal Power Commission granted the Grant County PUD a license to build the Priest Rapids dam. Priest Rapids was originally authorized as a federal project but no funds were allocated for construction. The license issued to the PUD authorizes it to build and operate the Priest Rapids development and the proposed upstream Wanapum development as a multipurpose project.

The Priest Rapids project is a partnership project in every way, and, in fact, it comes very close to being exactly the same as the John Day partnership proposal which is under heavy attack from all the public power lobbies. First of all, Priest Rapids is a partnership with the federal government in that the license provisions include one that will facilitate future installation of navigation locks. These locks, if and when they are installed, will be paid for by the federal government. But while this federal right to install locks in both Priest Rapids and Wanapum dams makes this a partnership project there is something else that makes the project appear to be a John Day proposal right down the line—that is the method of financing the project.

Thirteen "partners" are assuming responsibility for the repayment of all the project costs and in exchange for this they get a percentage of the output of the project. Four private utilities, Washington Water Power, Pacific Power & Light, Portland General Electric, and Puget Sound Power & Light, have agreed to purchase a total of 41.9 per cent of the output of Priest Rapids. All of the contracts are identical (except for name of purchaser and per cent of power) and provide that each purchaser shall pay in monthly instalments his proportionate share of all annual power costs resulting from development, ownership, operation and maintenance of, and renewals and replacements to, the production system.

These contracts mean, in effect, that each purchaser is liable for a proportionate share of the costs of the project. These contracts were drawn up in advance of the bond sale and they are a guaranty to the bond purchasers that the power from the project could be sold and that the PUD could meet bond payments. Six municipal systems (two in Washington, four in Oregon) and two Washington PUD's have also signed power contracts with Grant county for portions of power. Their contracts total 21.6 per cent of the total output of the project.

In the prospectus for the $166 million bond issue for Priest Rapids dam, the

consulting engineers had this to say:

A market for the output of the production system is assured, at rates sufficient to cover all costs, including amortization of bonds because—

(A) Fifty-year power sales contracts for an aggregate of 63.5 per cent of the output and requiring the payment of 63.5 per cent of the annual cost of the production system have been executed with twelve electric systems.

(B) The anticipated rapid growth of the districts' requirements for normal service will require the remaining 36.5 per cent of the output by 1965.

(C) Sales of low-cost power to new electro process industrial plants may take a substantial part of the output before 1965.

(D) Electric systems and existing industrial plants in the area will purchase all power from the project temporarily surplus to the needs of the district between 1960 and 1965, since alternative supplies will be higher in cost.

Thus, Priest Rapids, with a name-plate rating of 630,800 kilowatts, is being built by the Grant County Public Utility District but the financing and early construction of the project were made possible by the willingness of the four private utilities in the area to sign 50-year contracts with the PUD that guarantee repayment of 42 per cent of the bonds. These contracts all run until the year 2005. Any utility spokesman in the Northwest will frankly admit that without these advance contracts, in effect a blank check since no one is certain just what the power cost will be yet, the PUD would not have been able to finance a project the size of Priest Rapids. While you might have to pressure some of the public power crowd into admitting the truth of this, these same people will blatantly tell you that the private power companies are hampering development in the Pacific Northwest.

No one disputes the value of Priest Rapids, but too many people seem willing to overlook the fact that it is a perfect example of partnership—a way of getting needed power development now at little or no cost to the federal government. It would seem that partnership is bad only

Purchaser	*Per Cent Of Output For Which Obligated*	*Name-plate Rating*
Pacific Power & Light Company	13.9%	87,681 Kw
Portland General Electric Company	13.9	87,681
City of Seattle, Washington	8.0	50,464
City of Tacoma, Washington	8.0	50,464
Puget Sound Power & Light Company	8.0	50,464
Washington Water Power Company	6.1	38,479
Public Utility District No. 1 of Cowlitz County	2.0	12,616
Public Utility District No. 1 of Kittitas County	0.4	2,523
City of Eugene, Oregon (Water & Electric Board)	1.7	10,724
City of Forest Grove, Oregon	0.5	3,154
City of McMinnville, Oregon	0.5	3,154
City of Milton-Freewater, Oregon	0.5	3,154
Subtotal	63.5	400,558
Reserved by the District	36.5	230,242
Total	100.0%	630,800 Kw

when the federalizers are not in the driver's seat.

If a good share of the credit for early construction of Priest Rapids should go to the private utilities in the area then you will have to give one of them almost all the credit for the fast start on the $250.6 million Rocky Reach dam. This big project with a name-plate rating of 630,000 kilowatts (almost exactly the same as Priest Rapids) is being built by the Chelan County Public Utility District on the Columbia river about nine miles upstream from Wenatchee, Washington. About the only thing the PUD can get full credit for is getting the license for the project. Puget Sound Power & Light Company is making all the rest of the project possible.

Under the terms of the power contract between the Chelan PUD and PSP&L covering Rocky Reach dam, all of the output of the project has been purchased by Puget subject to the allotment of up to 40,000 kilowatts to the Douglas County PUD and the Chelan PUD's *reservation* of up to one-half of the remaining output of the project. Puget assumes responsibility for all annual costs with the Chelan PUD reimbursing Puget on a proportional basis for the cost of power withdrawn by Chelan PUD and Douglas PUD.

In the prospectus for the $23.1 million bond issue for first-stage construction of Rocky Reach dam, you will find this paragraph:

> Puget has thus, in effect, under this contract, assumed direct liability for the payment of all of the annual costs of the Rocky Reach project including debt service, operating, maintenance, and administrative expenses, and provision for renewals and replacements and other reserves.

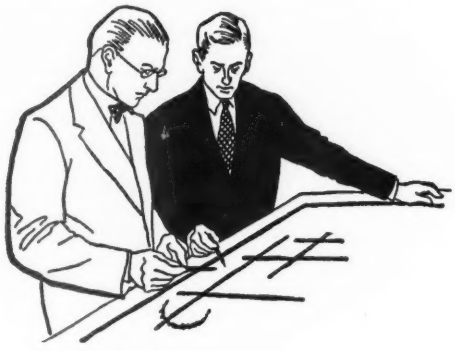
While the Chelan County Public Utility District has the license for building Rocky Reach dam the above statement might lead one to ask, "Just who is building Rocky Reach dam?"

On November 30, 1956, the *Public Power News,* official publication of the Washington Public Utility District Association, had this to say about Rocky Reach financing:

> Ordinarily a PUD would not be a large enough operation to have a credit standing required to borrow on an instalment basis to finance a large power project, and it was only possible to organize the instalment financing of Rocky Reach by tying revenues from the Rock Island project into the scheme. A special surcharge will be levied against the power from that project to provide revenue in support of the revenue bonds issued.

The above statement naturally leads one to examine the Rock Island project and see just what connection it has with Rocky Reach dam.

In May, 1951, the PUD financed construction of extensions to Rock Island dam under a 50-year lease agreement with Puget, the owner of the project. The extensions and improvements were financed through issuance of $33.6 million in revenue bonds. In January, 1956, the PUD acquired complete ownership of Rock Island dam by acquiring from Puget the original dam and generating station with the proceeds of a $31,830,000 revenue



The Basis of Priest Rapids Financing

". . . Priest Rapids, with a name-plate rating of 630,800 kilowatts, is being built by the Grant County Public Utility District but the financing and early construction of the project were made possible by the willingness of the four private utilities in the area to sign 50-year contracts with the PUD that guarantee repayment of 42 per cent of the bonds. These contracts all run until the year 2005. Any utility spokesman in the Northwest will frankly admit that without these advance contracts, in effect a blank check since no one is certain just what the power cost will be yet, the PUD would not have been able to finance a project the size of Priest Rapids."

bond issue. These properties, together with the improvements and extensions financed with the 1951 bond issue, have a peaking capability of 249,000 kilowatts. All of the power and energy of Rock Island dam have been sold to Puget under a long-term contract terminating in 2004, subject to certain conditions set forth in a supplemental power contract.

To find out the reasons for the need for this supplemental power contract with Puget one must look at the Rocky Reach financing. It was decided that the Rocky Reach dam must be financed in two stages. The first stage called for a $23.1 million revenue bond issue and the second stage will call for a bond issue of $227.5 million.

In order to assure the bond purchasers of the ability of the PUD to redeem the bonds, a surcharge was placed on the power sold to Puget by the PUD from the already existing Rock Island project.

So now Puget, which was already guaranteeing repayment of the Rock Island project bonds under a contract to purchase the power generated there, has agreed to a surcharge on that power in order to assure purchasers of first-stage Rocky Reach revenue bonds that they will get their money no matter what happens to the Rocky Reach project.

THE new supplemental power contract for Rock Island power is subject to certain previous commitments by the PUD, but from December 16, 1958, until December 31, 1966, it allows the PUD to take for its own use not more than 12,000 kilowatts and then the following amounts year by year:

Year	*Not More Than*
1967	15,500 Kw
1968	24,500 Kw
1969	34,000 Kw
1970	44,000 Kw
1971	55,500 Kw
1972	67,500 Kw
1973	80,500 Kw
1974	94,500 Kw
1975	110,000 Kw
1976 and thereafter during the life of the Rock Island power contract	124,500 Kw

One unusual thing about the power contracts between Puget and the Chelan PUD (and also between the PUD and Washington Water Power on power from the Chelan Falls hydro project previously owned by WWP) is that in all cases the private utility takes all the power from the projects and predetermined amounts of it are sold back to the PUD.

The Chelan PUD sells power at retail to approximately 16,000 customers and its peak load in 1955 was 43,290 kilowatts. It is anticipated that this peak will reach 88,700 kilowatts by 1966. The PUD is reported to be conferring with the Aluminum Company of America regarding the possibility of selling power and energy to Alcoa from the Rocky Reach project for the aluminum company's Wenatchee, Washington, plant. Alcoa has indicated an interest in Rocky Reach power but no definite arrangements have been made at the present time. The Chelan PUD also sells some power to the Douglas County PUD, which is located just across the Columbia river.

There is one interesting and almost amusing thing about this Chelan PUD-PSP&L partnership. The Chelan PUD acquired all of its distribution properties (except a small part of northern Chelan county) from PSP&L by condemnation in 1948. For a good many years after that, and to a certain extent even now, the PUD'ers have been telling the public how lucky they were to have been rescued from the monopolistic grip of a private utility that was siphoning all the power off to the coast. It was considered a rank injustice to have to pay the private company a small light bill every month when the PUD was condemning the private company's properties but now it is considered good business to enter into a $250 million deal with that same private utility when the PUD needs a partner with some credit.

Swift Hydroelectric Projects

To increase the power supply of the area, the Pacific Power & Light Company and Public Utility District No. 1 of Cowlitz county, Washington, are undertaking the construction, on an integrated basis, of the 256,500-kilowatt Swift hydroelectric project on the Lewis river upstream from the PP&L Yale plant.

The project will consist of two units; namely, Swift No. 1 development, consisting principally of the dam and a generating station with 189,000 kilowatts of installed capacity to be built and owned by PP&L; and Swift No. 2 development, consisting principally of a generating station with 67,500 kilowatts of installed capacity and a $3\frac{1}{2}$-mile canal extending from the dam to such generating station proposed to be built and owned by the dis-

trict. The company expects to complete its construction by December 31, 1958. Under the terms of a letter agreement (dated July 13, 1956) entered into on July 16, 1956, a copy of which constitutes an exhibit of the registration statement, the total cost of both developments, when completed, will be adjusted so the district shall pay 26 per cent and the company 74 per cent thereof, with each party being entitled to a corresponding percentage of the power output. Briefly, the agreement also provides that the district will sell its proportion of project power to the company at the district's cost until such time as required by the latter when it may be withdrawn, in whole or in part, on three years' written notice to Pacific Power & Light Company.

Construction of Swift No. 1 development by PP&L was authorized by the issuance of Federal Power Commission License No. 2111 on October 29, 1956, and construction is well under way. Federal Power Commission License No. 2213 authorizing construction of Swift No. 2 development was issued to Cowlitz PUD on November 29, 1956. The cost of the project, including related transmission facilities, is estimated at $63.3 million with $46.9 million to be borne by PP&L.

Lewis River Muddy and Meadows Sites

INVESTIGATIONS under Preliminary Permit No. 2112 received from the Federal Power Commission have indicated the feasibility of building a hydroelectric project at the Lewis river Muddy site, immediately upstream from the Swift project, and on November 26, 1956, Pacific Power & Light made application to the Federal Power Commission for a license to build such a project with an installed capacity of 102,800 kilowatts. The letter agreement entered into on July 16, 1956, with Cowlitz County Public Utility District No. 1, as supplemented by letter agreement dated November 13, 1956, provides in general that the district may, within one year from the date of a Federal Power Commission order authorizing a license, elect to build the project and that the company will co-operate in effecting transfer of its rights in the project to the district. The company has also received Preliminary Permit No. 2191 from the Federal Power Commission to enable it to make engineering and feasibility investigations with respect to the possibility of harnessing several small headwater tributaries of the Lewis river to produce about 75,000 kilowatts of power at the Meadows site. In general, under the letter agree-

¶ "THE *success of . . . partnership dams, all big power projects that will go a long way toward alleviating the power shortage in the Pacific Northwest, leads to this logical question: If these partnerships between local public agencies and private utilities are both workable and desirable, why won't partnerships among these same local public agencies, private utilities, and the federal government work? The answer is simple: They will work and they are the best solution to a problem that has been bothering every utility leader in the Pacific Northwest.*"

ment as supplemented, if the Cowlitz County Public Utility District does not exercise its option to build the Muddy project and PP&L proceeds to build it, the district has an option, until October 1, 1958, to take over construction of the Meadows project. If neither party to the letter agreement has decided to build the Muddy project, the district's option shall be for a 63½ per cent interest in the Meadows project and its power output. If both projects are built, one by each party, the district shall be entitled to 59 per cent of the combined power output and PP&L 41 per cent. As is true with respect to the Swift project, the agreement also provides that the district will sell its proportion of power from these projects, if built, to the company at the district's cost until such time as required by the latter when it may be withdrawn, in whole or in part, on three years' written notice to the company.

THE success of these partnership dams, all big power projects that will go a long way toward alleviating the power shortage in the Pacific Northwest, leads to this logical question: If these partnerships between local public agencies and private utilities are both workable and desirable, why won't partnerships among these same local public agencies, private utilities, and the federal government work?

The answer is simple: They will work and they are the best solution to a problem that has been bothering every utility leader in the Pacific Northwest. Partnership is a means of keeping up with the power needs of the area. It also will assure customers of both public and private power distributors of an adequate supply of power to serve their needs—now and in the years to come.

THE much-abused John Day bill has been outlined as a conspiracy between the administration and private utilities. Everyone seems to have forgotten that the John Day bill clearly defines the local interests who would pay 88 per cent of the project's construction costs as "states or agencies thereof; people's utility districts, public utility districts, and municipalities operating electric distribution systems; rural electric co-operatives; and private electric utility companies."

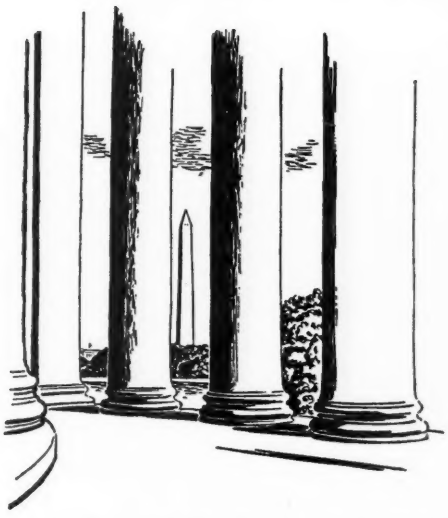
The bill further provides that "Any local interest—may within six months from the date of enactment of this act, make application in writing to the Federal Power Commission . . . for participation in the project."

Does that sound like any local public agency engaged in the distribution of electric power is being discriminated against? To say that partnership power projects are bad is to say that democracy is bad because partnership is democracy at work.

"EXPERIENCE can be of very great value in any high office; yet experience is not of itself a virtue, and it should by no means be considered the ultimate excellence of a man's character. Indeed, experience can have constricting effects if experience alone dictates a decision . . . There are far more important considerations than experience, we think . . . And not the least is good judgment. It does not matter how much experience a man may have if he judges unwisely."

—EDITORIAL STATEMENT,
The Wall Street Journal.

Washington and the Utilities



REA Interest Rates

NEITHER Secretary of Agriculture Benson nor REA Administrator Hamil had much to say about the reported proposal by President Eisenhower that federal government lending agencies ought not to be making loans at rates less than the Treasury pays. The Rural Electrification Administration was specifically mentioned in a discussion which Republican congressional leaders had with the President, according to Senator Bridges of New Hampshire, chairman of the Senate Republican policy committee.

What brought the subject of REA cheap interest rates to the fore was a complaint made by Representative Halleck (Republican, Indiana), who told the White House meeting that the Hoosier Co-operative Energy, Inc., had applied for a $42 million loan to build a power plant which would sell partly to REA co-operatives and partly to private industry. Actually, the Indiana loan was one of the controversial "super co-op" types whereby the REA money would be used to finance the construction of a plant to be leased back to a private industrial customer. The application had aroused the opposition of the Indiana Public Service Commission, which intervened by asking REA to refuse the loan.

Senator Saltonstall (Republican, Massachusetts) told reporters that REA loans were made at a 2 per cent interest rate and that making such loans to serve private industry was beyond the theory of the law. Senator Bridges added that the President had announced that the administration is drafting a bill to prevent all government agencies from making loans at less than the interest rate paid by the Treasury on its borrowings. Presumably, legislation would cover REA rural telephone loans as well as REA electrification loans. Such loans are now made at the statutory rate of 2 per cent.

Senator Bridges told reporters that "It is indefensible for government agencies to make 2 per cent loans when the government itself has to pay an average of about 3½ per cent to borrow money." He added that the 2 per cent rate was set by law at a time when the government was getting its money at a much cheaper rate.

TWO bills to raise REA's interest rate already have been introduced, one

(HR 4781) by Representative Hiestand (Republican, California) and another (HR 7795) by Representative Becker (Republican, New York). It is believed, however, that the administration bill on the subject would apply broadly to all federal lending agencies. Senator Bridges quoted the President as saying that the proposed bill had been approved by the Budget Bureau and was then being reviewed by the Treasury Department.

In the Indiana case, the state public service commission asked Secretary of Agriculture Benson to reject the Hoosier Co-operative Energy, Inc., application for a $42 million loan because it would duplicate service by investor-owned electric utility companies in that state. Hoosier's generators would supply some of their power to Richards & Associates, and its subsidiary, the South Wire Company, Carrollton, Georgia, for an aluminum plant they plan to build in Indiana. Hoosier also would supply power to its nine member electric distribution co-operatives in southwestern Indiana.

The Agriculture Department's REA suggested the Indiana commission get together with power companies and the co-operatives to try to "arrive at a conclusion" on the loan, according to the REA officials. Aides said the REA received the loan application about mid-May. It normally takes months, they added, before the REA completes studies and decides whether to approve a loan. Hoosier has not borrowed from the REA before.

THE loan application proposes construction of three steam-generating units of 66,000 kilowatts capacity each near Petersburg, Indiana, and about 900 miles of transmission line. The three units would have a firm capacity totaling 132,000 kilowatts and stand-by of 66,000 kilowatts. Hoosier would lease the plant to Richards, retaining first rights to buy back power for the co-operatives. The co-operatives would not need all 132,000 kilowatts of firm capacity at first. Richards would use the surplus power for its aluminum plant, which would need about 66,000 kilowatts. The company would build 55 miles of transmission line on its own to carry power to its plant.

When requirements of the co-operatives reached 132,000 kilowatts, according to the plans, Richards would build a 66,000-kilowatt generating unit on its own. Power from this fourth unit would be available both to the aluminum plant and to the co-operatives. REA electric loans are available only to co-operatives, not to private companies. The largest single REA loan to date was for $18.6 million. Borrowers must pay off loans at 2 per cent interest in thirty-five years, including a 5-year waiting period before the first repayment.

CHAIRMAN John Van Ness of the Indiana commission said he opposed the loan because "we see no reason why the taxpayer should pay the costs for generation when service already is available from private companies which pay federal and state taxes. We feel the system would be a duplication of service available from private utilities. We have statements from the utilities that they will supply any industrial plant." In addition, he claimed the co-operative's proposal "should have been cleared" with his commission.

Chairman Van Ness reported Secretary Benson made no commitment, but commented that the REA "does not want to promote duplicate services." The official said the commission "will talk things over" with the utilities and co-operative to see if the problem "can be solved that way, without disagreement or bad feeling." Governor Handley backs the commission

in its opposition to the REA loan, Van Ness said.

Pamphleteering Expense

A NUMBER of electric utilities are checking their operating expense accounts as the result of a recent announcement by the Federal Power Commission that the expense of reprints of articles of a political nature should not be charged to operations. The FPC report, signed by Chairman Kuykendall, resulted from a study of 59 of the larger electric company accounts on request of the House Government Operations Subcommittee, headed by Representative Chudoff (Democrat, Pennsylvania).

The FPC ruled that the utilities had improperly charged off as operating expenses the cost of two pamphlets arguing against federal public power programs. The commission said these costs should have been classed as political expenditures and included in accounts the FPC does not include in service costs for rate-making purposes.

However, the commission noted the amounts involved in the two pamphlets were so small that even if they had been charged off properly, there would have been no significant effect on the rates the utilities could charge.

The commission's comments were contained in two reports sent to the House Government Operations Committee. A subcommittee headed by Representative Chudoff recently charged the private utilities had improperly charged off these costs, and asked the FPC to investigate and report. Chudoff raised the question of whether the costs of such pamphlets were proper deductions for the companies for income tax purposes. He said that FPC and Internal Revenue Service officials would be called before his panel to discuss the implications of the commission ruling.

Hell's Canyon Showdown Expected

JUST when Senate Leader Lyndon Johnson (Democrat, Texas) was about to call up the controversial bill to authorize a federal high dam on the Snake river in the Hell's Canyon area, the U. S. Supreme Court took final action confirming the legality of rival hydro licenses granted by the Federal Power Commission for three dams being built by Idaho Power.

The court announced final rejection of the petition of the National Hells Canyon Association and others for reconsideration of its action last April in upholding the FPC license to the Idaho Power Company. The petitioners had asked that the high court reconsider its earlier refusal to review lower court action confirming the FPC license. The basis for the second petition to review the case was the alleged new situation created by the recent action of the Office of Defense Mobilization in granting a rapid amortization tax certificate to Idaho Power Company to write off 60 to 65 per cent of the cost of two of the dams within five years.

This action of the highest court marks the positive end of this long-drawn-out litigation and leaves only the slight possibility that Congress will approve federal high dam legislation as the sole remaining hope of the Hell's Canyon government ownership group. The Senate debate on the bill authorizing federal construction of Hell's Canyon dam on the Snake river has once again been delayed. The log jam resulting from the Memorial Day holiday has been assigned as one reason. But a more plausible explanation is a feeling on the part of the bill's supporters that they do not have the votes to put the measure across.

Advocates of the federal dam are believed to be playing for time in order to build up popular support, through publicity, for the federal dam through testimony before the Senate Judiciary Antimonopoly Subcommittee, headed by Senator Kefauver (Democrat, Tennessee). This also explains some of the provocative remarks of Senator Morse (Democrat, Oregon), obviously calculated to attract attention to this controversial matter.

The Gas Bill Changes

HEARINGS before the House Interstate and Foreign Commerce Committee on the controversial Harris-O'Hara Bill to relax federal controls over natural gas producers were concluded on June 4th. Chairman Harris (Democrat, Arkansas) hoped to have a bill ready for House action, probably in late June. However, the indications were to the contrary, because no way has been found to compromise the views of the producers, on the one hand, and the administration on the other. Testimony during the latter part of May showed the producers adamantly opposed to amendments which would permit the FPC to consider cost of production as one measure of determining a reasonable price, and to review definite pricing clauses in existing producer contracts. It is the latter amendment that has particularly aroused opposition.

The House Commerce Committee delay has probably ended whatever chance there was for Senate consideration of a gas bill at this session of Congress. Chairman Magnuson (Democrat, Washington) of the Senate Interstate Commerce Committee has said flatly his committee will not consider a gas bill until next January, at the earliest, regardless of what the House does. A Senate spokesman said the Democratic leadership sees no point in lengthy committee hearings and extended Senate debate on a bill whose fate is uncertain in the House.

Dissatisfaction on the part of the producers with the administration's amendments, the likelihood that the vote in the House, if any, will be close, and lack of active support from the President have all hurt the bill's chances, the spokesman said. With all those factors against the bill, the leadership is determined to wait for House action before diving into the controversy the bill would inevitably produce in the Senate.

TVA Legislation

NEW legislation has been introduced to require the Tennessee Valley Authority to pay federal income taxes and interest on the federal investment in its power facilities. The bill (S 2145), sponsored by Senator Martin (Republican, Pennsylvania), would also limit TVA to its present service area and authorize the FPC to regulate its rates. Future expansion of TVA would be financed by issuing revenue bonds, of which not more than $750 million could be outstanding at any one time.

Martin told the Senate that his bill is not designed to do away with TVA but to get it "off the backs of the taxpayers." He said TVA has expanded to the point where it no longer needs a subsidy from taxpayers and should be put on a basis equal with other business enterprises. Martin noted that the contribution of his state, Pennsylvania, to the $2 billion federal investment in TVA is $147.3 million as contrasted to $25 million contributed by Tennessee. The bill was referred to the Committee on Public Works.

Telephone and Telegraph

FCC Frequency Rule

A PROPOSED Federal Communications Commission rule would grant exclusive use of certain radio frequencies to telephone companies, despite opposition from other utility and industrial groups. Last year, when the FCC issued a proposed order providing for three pairs of frequencies in the 450-460 megacycle band for use by telephone companies, objections from other industrial users resulted in a "stay" of the commission's order, although the frequencies were to be used on a shared basis with other users and were to be used for intrasystem communications only. The new proposed order recognizes the "inherent need" of telephone companies for radio facilities in connection with construction and maintenance activities. Said the commission:

> Although the . . . need of the communications common carriers has not been seriously challenged, it has been strongly contended that the commission should not attempt to satisfy this need by including the carriers as eligibles under the Power Radio Service Rules. The foregoing contention is grounded, principally, in considerations relating to frequency congestion and co-ordination of frequency usage within the Power Radio Service. To date, however, there has been no effective challenge of the basic premises pointing to the propriety of our classifying carriers (telephone companies) with gas, electric, and water companies. These premises can be summarized as follows: (1) The public's access to a communication service is a convenience of the same general importance as its access to gas, electric, and water services. (2) Carriers normally serve the same general areas as do gas, electric, and water companies. (3) The over-all characteristics of the carriers are similar, in many respects, to those of the above companies.

THE commission does not propose to make all of the frequencies which will be allocated to the Power Radio Service available to the communications services. The proposed rule contemplates making available to the carriers a total of five 50-kilocycle frequency pairs (ten frequencies) in the 450 megacycle band on a non-sharing basis. To assure exclusive use at the outset, the commission has selected these frequencies from those being obtained by the reduction in channel separations in this band. "In connection with this question of frequency availability," said the FCC, "the commission believes

that the carriers can satisfy their additional frequency requirements by taking advantage of their eligibility in the Business Radio Service should the simultaneous proposal with respect thereto be finalized."

Comments on the proposed rule were due June 10th. In the event that communications common carriers are made eligible in the Power Radio Service, the FCC proposes to rename such service the "Utilities Radio Service," the latter title becoming more descriptive of the whole of the eligibles in the service.

Subscription TV

THE way has been cleared for a trial run of the controversial subscription TV, now that the FCC has decided it has power to authorize its use. Opponents of toll TV maintained that the commission had no legal authority to decide the issue, but the FCC, which has been studying the toll TV problem for two years, based its authority to sanction its use on the Communications Act of 1934 which gives the commission the right to license radio frequencies. The FCC still has to determine whether a pay-as-you-see TV can be classified as broadcasting or some other type of service.

A decision on whether or not to authorize the use of the new system is expected some time before the commission adjourns for an August vacation. There are signs that the commission favors a test of subscription TV, but it has invited comments before July 8th on such questions as whether the system should be confined to major metropolitan areas, whether a limit should be placed on subscription programming, and whether toll TV should be channeled only through ultra-high-frequency stations.

On another TV front, the FCC gave a green light to international television between Florida and Cuba. The commission granted American Telephone and Telegraph Company and Florida Micro Communications, Inc., authority to begin "over-the-horizon" TV transmission. Both companies plan to relay television programs 180 miles between Florida and Cuba by means of the "tropospheric scatter" technique.

REA Loans

THE Rural Electrification Administration granted $9,172,000 in loan funds to telephone co-operatives during the period May 6th-24th. The largest loan, $2,932,000, went to a new borrower, Western States Telephone Company, Inc., Holbrook, Arizona. The borrower plans to use the funds to furnish service for the first time to 2,607 subscribers in its expanded territory and to improve service for 3,341 existing subscribers. The proposed new system will consist of three noncontiguous areas in three states. The company will furnish its own toll service for the Arizona subscribers. Service without toll charge between two New Mexico exchanges and two Arizona exchanges is included in the company's present plans.

Other loans included: $190,000, South Plains Telephone Co-operative, Lubbock, Texas, its fourth REA loan; $830,000, Modern Telephone Company, Norwood, Missouri; $81,000, Gill Township Telephone Company, Inc., Merom, Indiana; $680,000, Wilson County Telephone Company, Inc., Floresville, Texas; $380,000, Pea Ridge Telephone Company, Pea Ridge, Arkansas; $101,000, Gorham Telephone Company, Gorham, Kansas, its third loan; $140,000, Star Telephone Company, Maringouin, Louisiana, its fifth loan; $174,000, Smithville Telephone Company, Smithville, Mississippi.

Southern Bell Wage Accord

THE Southern Bell Telephone & Telegraph Company and Communications Workers of America have agreed on a new labor contract that will add $1,250,000 annually to the cost of providing telephone service in Louisiana. Wage increases ranging up to $4 per week, depending on the job and town classification of the employees, are included.

The contract between the company and the union affects 8,335 employees in Louisiana and 49,305 in the eight other states served by Southern Bell. It was estimated the new contract will add $9 million to Southern Bell's production costs in nine states.

W. K. Boardman, Jr., vice president and general manager of Southern Bell, said the wage increases were necessary to keep the pay of employees in line with the wage levels of other businesses in Louisiana communities where Southern Bell operates. "Good employees are essential to good telephone service and good wages are necessary to attract and retain competent people," Boardman said. "The contract is a good one that is fair and just to the employees, the public, and the owners of the business. Such increases in the cost of providing telephone service must, however, ultimately be reflected in telephone rates since our only source of revenue is customer payments for service. Earnings of Southern Bell in Louisiana are at a critically low level now and this necessary cost increase will reduce them still further."

Other modifications in the contract include reclassification of a number of cities and towns for wage purposes and consolidation of the company union recognition agreement and the working agreement, formerly two documents, into one, Boardman said.

Rate Boost Denied

THE Minnesota Railroad and Warehouse Commission has turned down a request for a rate increase by Northwestern Bell Telephone Company. The company, which has received six rate boosts since 1946, was seeking an order establishing "fair and reasonable rates" for all classes of telephone service. No specific rates were asked in the company's petition.

The commission estimated that the company would realize a rate of return of at least 6.2 per cent in 1957 and contended that the present exchange and toll service rates "are just, fair, and reasonable and are sufficient to yield a reasonable rate of return on the fair value of the company's property."

Northwestern Bell plans to renew its request for an increase. The company's vice president, Wayne L. Huffman, said the commission's order indicated a belief that the company would be able to absorb all of the added costs which have been incurred during the period 1954-56 and still be able to operate in 1957 without any substantial decrease in earnings. Huffman said the company's experience so far this year confirms estimates of diminishing returns made last winter. "The fact is that our earnings are too low," Huffman said. "Earnings requirements are higher today than for many years and we have no choice but to go again to the commission and attempt to convince them of this fact." Only an increase in telephone rates "will prevent further weakening of our ability to meet the needs of our customers, employees, and security owners," Huffman concluded.

Financial News and Comment

By OWEN ELY

New Private Plans for Atomic Reactors Despite Political Handicaps

Politics continues to play an important rôle in the development of atomic power. The struggle between proponents of a "crash program" for public construction of reactors, and those favoring the present partnership program of the AEC, continues to delay constructive developments such as a federal insurance program. Representative Durham, chairman of the congressional Joint Atomic Energy Committee, recently proposed a new ten-year government program to stimulate public and private development of atomic reactors. Chairman Cannon of the House Appropriations Committee wants to require the AEC to submit to the congressional Joint Atomic Committee all proposals for government aid to private interests in the building of reactors and conducting of research.

Now, to add to other difficulties, the question of radiation hazard from possible accidents with atomic reactors is being confused with the more obvious hazards from nuclear bomb tests or actual warfare. At the recent hearings before the congressional Subcommittee on Atomic Energy, Dr. Charles L. Dunham, director of the division of biology and medicine in the AEC, warned that some undesirable fallout was an inevitable result of nuclear explosions and stated that the degree of undesirability must be weighed against the advantages gained from testing of weapons or *from the peaceful uses of atomic energy.*

In New York city Dr. Thomas Parron, former U. S. Surgeon General, and now dean of the Graduate School of Public Health at the University of Pittsburgh, warned that atomic radiation is the greatest single public health problem of the future. He stated that the peril will come not only from the testing of nuclear weapons, but from the vast amount of "garbage" created in the peaceful use of atomic energy. He held that radiation now present in the atmosphere was "infinitesimal" compared with what would be produced by the construction of atomic power plants. The *Electrical World's* second annual report on nuclear power points out that clear fuel and fission products

Department Index

	Page
New Private Plans for Atomic Reactors Despite Political Handicaps..	914
May Utility Financing	916
Chart—Fuel Costs 1952-58	918
California Fuel Costs	919
Table—Data on Electric Utility Stocks	920, 921, 922

(about one pound of each will be handled each day in a 100,000-kilowatt plant) must be controlled so carefully that far less than one-trillionth of their radiation escapes into space occupied by men.

HOWEVER, in a recent address before the New York City Board of Fire Underwriters, Commissioner Harold S. Vance of the AEC stated that nuclear reactors have been operated for nearly fifteen years with "a safety record far better than that of even the safest industry. Over one hundred reactor years of regular operating experience have been accumulated . . . without a single personal injury and with no significant deposition of radioactivity outside the plant area. There have been a few accidents with experimental reactor installations, as contrasted with the perfect record of safety of the regularly operating reactors, but even these accidents did not affect the public."

While Congress is still dallying with the bill for a half-billion of insurance for each reactor, thus jeopardizing the construction schedules of several utility projects, the private insurance groups have finally perfected their plans to insure reactors and other atomic plants up to $50-$100 million. The first policy was written on a chemical processing plant in Missouri by the Nuclear Energy Property Insurance Association, representing 185 companies. However, private insurance rates are considered rather high.

Following the meetings last December with representatives of Canada and Great Britain, the AEC has speeded up the reclassification of its huge file of secret documents and is now releasing a vast amount of information to qualified engineers and businessmen. Semimonthly journals now are being made available to industry containing abstracts of available atomic documents, including the results of foreign research. For less than $40 a set of 77 drawings can be obtained describing how to build an atomic reactor. In addition to the cataloguing of AEC material, the program involves frequent educational meetings, plant tours, briefings, mailings, price setting, etc. On May 27th 500 scientists, engineers, and other specialists were scheduled to meet at the Argonne Laboratory to study the commission's experimental boiling water reactor. The new program should save the industry large amounts in research and engineering costs.

AEC Chairman Strauss has continued, in recent addresses, to "hold the line" for a partnership program. He recently urged that peaceful uses of atomic energy could best be developed "in the framework of the competitive economic system—and thus benefit from the rapid expansion and cost-cutting incentives such as have characterized the iron and steel industry. . . . Government and industry must work hand in hand in developing the atom's peaceful uses, including government assistance through research and experimental development for the benefit of all industry." He predicted that within twenty to twenty-five years the U. S. would have 227 million kilowatts installed nuclear capacity (nearly twice present steam and hydro capacity) which would produce nearly one-third of total electrical output.

In the foreign field, the AEC is trying to further the interest of American makers of nuclear reactors and equipment. At the recent Japanese-American conference in Tokyo, American atomic experts (associated with both government and industry) tried to "sell" American reactors, to be powered by enriched uranium which is only available in the U. S. The British

reactor now operating at Calder Hall uses natural uranium and according to *U. S. News* the Japanese apparently feel that this reactor is "tried and true." While an AEC representative criticized the use of natural uranium, his argument may have lost force because of the fact that the commission has asked U. S. utilities to build a reactor to use such fuel, and Florida utilities recently submitted plans for such a reactor.

COMPETITION will also be keen to sell reactors to Continental Europe. Euratom, Europe's new six-nation atomic power commission, is planning a ten-year $6 billion program to provide 15 million kilowatts of atomic power capacity by 1967, or two and a half times as much as planned by England. The move was stimulated by the recent oil problems resulting from the closing of the Suez Canal, as well as the increasing cost of imported

MAY UTILITY FINANCING

PRINCIPAL PUBLIC OFFERINGS OF ELECTRIC AND GAS UTILITY SECURITIES

Date	Amount (Mill.)	Description	Price To Public	Underwriting Spread	Offering Yield	Aver. Yield For Securities of Similar Quality	Moody Rating	Success Of Offering
		Bonds and Debentures						
5/2	$10.0	Laclede Gas 1st 4⅛s 1987*	101.82	.99C	4.75%	4.01%	A	a
5/8	25.0	Cincinnati G. & E. 1st 4⅛s 1987	99.25	.66C	4.17	3.74	Aaa	b
5/9	14.0	Potomac Edison 1st 4⅛s 1987	101.72	.75C	4.52	4.01	A	d
5/10	14.5	Alabama Power 1st 4⅛s 1987*	101.50	.83C	4.53	4.01	A	d
5/14	18.0	Central Maine Pr. 1st 4⅛s 1987*	102.78	1.00C	4.70	4.01	A	d
5/14	25.0	N. Y. State E. & G. 1st 4⅛s 1987*	101.55	.74C	4.53	4.01	A	a
5/16	6.5	El Paso Elec. 1st 4⅛s 1987	100.80	.73C	4.70	4.01	A	a
5/16	15.0	Florida P. & L. 1st 4⅛s 1987	102.05	.87C	4.50	3.86	Aa	a
5/17	8.0	Wash. Gas Light Ref. Mtg. 5s 1982*	100.00	.89C	5.00	4.01	A	a
5/21	30.0	P. S. of Colorado 1st 4⅛s 1987	100.00	.69C	4.38	3.86	Aa	a
5/23	20.0	Interstate Pr. 1st 5s 1987*	100.00	.85C	5.00	4.02	A	c
5/28	50.0	Tenn. Gas Trans. 1st 5¼s 1977*	100.00	1.10N	5.25	4.02	A	a
5/29	3.0	Community Pub. Ser. 1st 5⅛s 1987	101.88	1.74C	5.25	4.02	A	c
5/29	15.0	Natl. Fuel Gas Deb. 5¼s 1982*	101.36	1.20C	5.40	4.02	A	a
5/29	3.2	Intermountain Gas 6% Sub. Deb. 1982 Plus Common Stock	136.00	9.50N	—	—	—	—
		Preferred Stock						
5/16	2.0	El Paso Electric $5.40	102.86	2.85C	5.25	4.58	—	a
5/22	20.0	Niagara Mohawk Power 5.25%	100.00	2.00C	5.25	4.61	—	a
		Common Stock—Offered to Stockholders					*Earns.-Price Ratio*	*Notes On Issue*
5/9	2.6	El Paso Electric	22.00	—	4.55		6.2%	e
5/15	11.5	Florida Power Corp.	51.00	N	3.53		5.6	g
5/23	2.5	Public Service of New Mexico	13.50	.15N	5.93		8.5	i
5/29	.4	Intermountain Gas	7.50	N	—		—	k
		Common Stock—Offered to Public						
5/15	4.4	Central Hudson G. & E.	15.63	.47N	5.12		7.0	a
5/22	9.4	Interstate Power	13.75	.42N	5.82		7.5	a
5/28	2.1	Central Vermont P. S.	17.00	.72N	5.88		7.0	a

N—Negotiated. C—Competitive. *Sinking fund. a—Reported that the issue was well received. b—Reported that the issue was fairly well received. c—Reported that the issue sold somewhat slowly. d—Reported that the issue sold slowly. e—One-for-15 basis with oversubscription (dealer compensation). Ninety-six per cent subscribed, plus 34 per cent oversubscription. g—One-for-10 basis with oversubscription, underwritten. i—One-for-10 basis with offering to employees. k—One-for-6 basis.

Source, Irving Trust Company.

coal. The U. S. government has promised to help, but, as *Newsweek* points out, the big problem will be to raise the $6 billion.

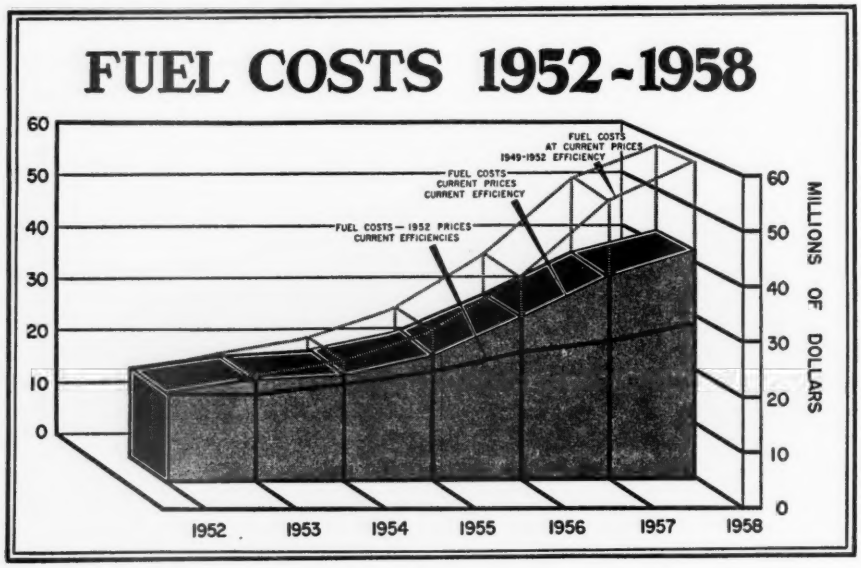
In connection with the contest with Britain to supply reactors to other countries some interesting cost figures were released in an SEC study, summarized in *The New York Times*. While present costs of power at the Shippingport plant will be very high, the commission assumed that with an improved version of the pressurized water-type reactor, to be available in the 1960's, operating costs should be lower. And the same was assumed for a "second generation" of the British gas-cooled type reactor. Both plants would have 90,000-kilowatt capacity and be available in the early 1960's. Due to lower wages and capital costs, and possibly savings in taxes, the British plant would have a substantial cost advantage over the U. S. reactor, which, however, would be considerably reduced if the British reactor were produced in this country. Following are the comparisons in the cost of power:

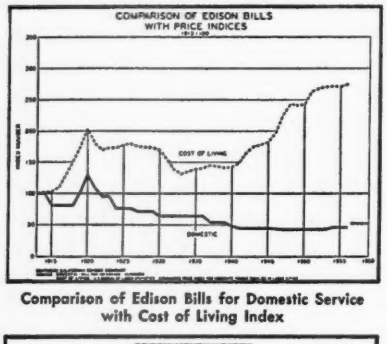
	Cost of Power in Mills Per Kwh.	
	British Reactor	*United States Reactor*
If constructed in U. S. .	18	20
" " " England	8	13
" " " Japan .	21	22

In January this year the AEC asked for a "third round" of partnership projects in the building and testing of new types of reactors, and expressed the hope that two new types would be tried out: (1) a reactor fueled by natural uranium and moderated by heavy water, and (2) one fueled by aqueous solutions or slurries of uranium, or of uranium and thorium-bearing materials. The Florida utilities (Florida Power Corporation, Florida Power & Light, and Tampa Electric) chose to sponsor the first type and asked the commission to aid with research and development and to waive fuel charges for five years. Target date for completion would be June, 1962. The plant will have a capacity of 136,000 kilowatts and is expected to cost about $40 million or around $295 per kilowatt. Natural uranium as a fuel is of course much cheaper than the enriched or processed variety, but it contains only 0.7 per cent of the fissionable U-235. The commission is expected to lend some aid in the form of research expenditures.

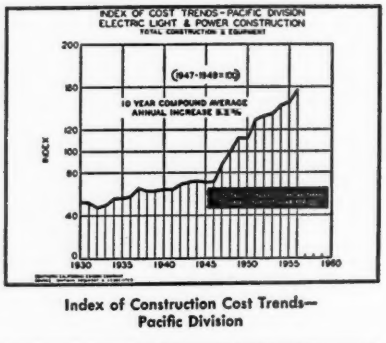
The Carolinas-Virginia Nuclear Power Associates are also planning a nuclear plant to be completed in 1962. Westinghouse Electric, along with Stone & Webster and the General Nuclear Engineering Corporation, will help the group to decide what type of reactor to build and where to locate it. Utilities composing this new group include Carolina Power & Light, Virginia Electric & Power, Duke Power, and South Carolina Electric & Gas. Northern States Power Company, in collaboration with the Central Utilities Atomic Power Associates (which includes 10 other midwest utilities), has also recently proposed to build a 66,000-kilowatt reactor plant.

Recent progress in atomic *fusion* announced by the AEC, and its plans to build a huge "Stellarator" at Princeton, has interested the southern utilities—which are not much concerned with atomic reactors because of very low fuel costs in that area. The Texas Atomic Energy Research Foundation, supported by eleven Texas utilities, has signed a $10 million contract with General Dynamics Corporation for four years' research in an effort to control the thermonuclear reactions, which involve a temperature of about 100 million degrees. No effort will be made to build a reactor, but only to do the mathematical spade work. The AEC will give the company some access to its

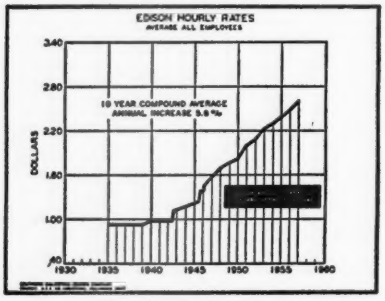




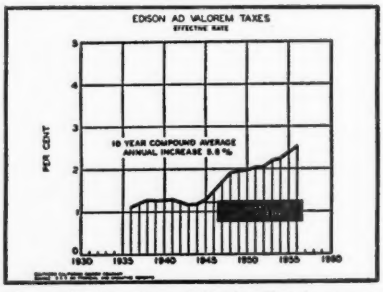
Comparison of Edison Bills for Domestic Service with Cost of Living Index



Index of Construction Cost Trends—Pacific Division



Edison Hourly Wage Rates



Edison Ad Valorem Taxes Related to Plant Investment

Source, Southern California Edison—Proceedings of Annual Stockholders' Meeting

"Project Sherwood" research — how much is not clear.

James K. Pickard has recently given a breakdown of fuel costs for atomic reactors in mills per kilowatt-hour as follows:

	Initial	*Subsequent*
Cold Processing and Fabrication	2.8	0.8
Net Burn-up Cost	1.5	1.5
Radioactive Processing and Handling	0.8	0.5
Total Carrying Charges	1.5	1.0
Total	6.6	3.8

REGARDING the high cost of reprocessing the atomic fuel, there is an interesting little news item in a recent Sunday science column of *The New York Times*. Dr. Alvin M. Weinberg, director of the Oak Ridge Laboratory, recently described an experimental reactor designed as a possible prototype for aircraft propulsion. It uses a circulating fuel (molten fluoride salts containing U-235) at a temperature of 1,500 degrees Fahrenheit. This high temperature makes possible a high thermal efficiency of 35 per cent. The liquid fuel principle keeps costs low by virtually eliminating the need of refabricating the fuel. The reactor could reduce fuel costs to as low as 2 mills per kilowatt, it was reported, which is competitive with conventional costs. Why cannot this process be developed for commercial reactors?

The *Electrical World* review presented a four-page tabular summary of proposed nuclear power plants, cost data (which differs somewhat from earlier estimates) being given for some plants as indicated in the table below.

California Fuel Costs

AT the annual meeting of stockholders, Southern California Edison presented some interesting charts and figures on the sharp rise in fuel costs in that state. In introducing the subject, President Harold Quinton discussed postwar inflationary trends and the fallacy of the widely held assumption that the economy needs a "regular annual increase in inflation" to provide a stimulus to business activity. He pointed out that despite improved generating efficiency, estimated fuel costs in 1958 (assuming normal hydro conditions) would approximate $42.5 million compared with $16.5 million in 1952. If there had been no improvement in efficiency, the cost would be $58.8 million; however, if the price of fuel had not gone up, the estimated cost for 1958 on that basis would be only $29.4 million.

	Initial Gross Capacity Mw	*Estimated Plant Cost Per Kw*	*Est. Cost of Energy at Bus Bar, Mills Per Kwh*
Consolidated Edison	275(d)	$254	10-12(c)
Commonwealth Edison and Others	180	250(a)	7-8(b)
Yankee Atomic Electric	120	—	12-14
Duquesne Light	60	550	—
Consumers Public Power District	80	475	10-11
Elk River Rural Co-op	22(d)	282	6.5
Municipal Power Dept. (Piqua, Ohio)	13	424	—
Chugach Electric Assoc. (Alaska)	10	735	—
Wolverine Electric Co-op (Mich.)	10(d)	486	7.3 aver.

a—Based on contract price.
b—Not capitalizing $15 million research and development cost.
c—In a separate article cost is broken down as follows: fixed charges ($67,350,000 at 13.3 per cent), 5 mills; fuel (nuclear and oil), 6.1 mills; operation and maintenance, 0.9 mills; total 12 mills.
d—Including superheater.

Thus the unit price of fuel has exactly doubled in the past six years, but more than half the increase has been offset by increased efficiency in the company's steam-generating plants. In the year 1957, because of poor hydro conditions, total fuel cost is estimated at $44 million or $1.5 million higher than the 1958 estimate, as it is assumed that next year hydro conditions will improve to "normal." The accompanying charts on page 918 illustrate the rising trends of fuel, wages, taxes, and construction costs.

MR. QUINTON said that he had received an inquiry from a stockholder as to why, with the rapid population growth, share earnings, and market action of Southern California Edison compared unfavorably with three other utilities in other growth states. In reply he mentioned that if another recent two-year period had been taken, Edison's market record would have made a more favorable comparison. He also emphasized the differences in regulatory processes in the areas, and expressed the opinion that the higher rates of return allowed in the other states (not mentioned) are "presumably in recognition of the greater risk involved to the investor since the areas of service have more of a pioneering nature than Edison's." He felt that the rate of return would tend to decline relatively in the other states while he was hopeful that it would be permitted to increase in California.

Regarding future share earnings he estimated on the basis of projecting first-quarter trends, about $3 would be earned for 1957, or $3.20 if the requested rate increase should be granted in full around August or September, while *pro forma* earnings for the twelve months beginning with the new rates should approximate $4.

DATA ON ELECTRIC UTILITY STOCKS

Annual Rev. (Mill.)			*5/29/57 Price About*	*Dividend Rate*	*Approx. Yield*	*Recent Share Earnings*	*% Increase*	*Aver. Incr. In Sh. Earns. 1951-56*	*Price-Earns. Ratio*	*Div. Pay-out*	*Approx. Common Stock Equity*
$268	S	American G. & E.	39	$1.44m	4.8%	$2.06Ma	3%	9%	19.0%	70%	34%
46	O	Arizona Pub. Serv.	27	1.12	4.1	1.78Ma	25	13	15.2	63	31
11	O	Arkansas Mo. Power	25	1.24c	5.0	2.01Ma	6	10	12.4	62	31
32	S	Atlantic City Elec.	30	1.30	4.3	1.67Ap	11	10	18.0	78	33
132	S	Baltimore G. & E.	35	1.80	5.1	2.45Ma	10	8	14.3	73	45
7	O	Bangor Hydro-Elec.	33	1.90	5.8	2.69De	22	8	14.7	71	35
5	O	Black Hills P. & L.	24	1.40	5.8	2.40Ja	10	1	10.0	58	27
99	S	Boston Edison	50	2.80	5.6	3.45De	1	2	14.5	81	50
21	A	Calif. Elec. Power	14	.76	5.4	.98Ma	5	16	14.3	78	36
21	O	Calif. Oreg. Power	33	1.60	4.8	2.30De	9	5	14.3	70	33
8	O	Calif. Pac. Util.	30	1.50	5.0	2.34Ma	5	6	12.8	64	25
63	S	Carolina P. & L.	25	1.20	4.8	1.69Ap	—	2	14.8	71	42
28	S	Cent. Hudson G. & E.	16	.80	5.0	1.08Ma	4	10	14.8	74	34
21	O	Cent. Ill. E. & G.	31	1.60	5.2	2.36Ma	7	11	13.1	68	33
35	S	Cent. Ill. Light	56	2.60	4.6	3.92Ap	6	8	14.3	66	42
51	S	Cent. Ill. P. S.	31	1.60	5.2	2.31Ma	D5	12	13.4	69	38
13	O	Cent. Louisiana Elec.	38	1.60	4.2	1.94Ma	2	8	19.6	82	32
35	O	Cent. Maine Power	22	1.40	6.4	1.80Ap	11	4	12.2	78	34
128	S	Cent. & South West	41	1.60	3.9	2.22Ma	5	15	18.5	72	35
12	O	Cent. Vermont P. S.	17	1.00	5.9	1.20Ap	1	1	14.2	83	31
114	S	Cincinnati G. & E.	27	1.20f	4.4	2.00Ma	—	7	13.5	60	43
7	O	Citizens Util. "B"	16	.90a	5.6a	1.15Ma	7	10	13.9	78	42
111	S	Cleve. Elec. Illum.	43	1.60	3.7	2.55Ma	D4	8	16.9	63	49
4	O	Colo. Cent. Power	28	1.20	4.3	1.82Ma	14	8	15.4	66	33
48	S	Columbus & S. O. E.	30	1.60	5.3	2.30Ma	4	5	13.0	70	36
360	S	Commonwealth Edison	40	2.00	5.0	2.78Ma	4	8	14.4	72	47
11	A	Community Pub. Serv.	25	1.20	4.8	1.87Ma	10	15	13.4	64	52

Annual Rev. (Mill.)		(Continued)	5/29/57 Price About	Dividend Rate	Approx. Yield	Recent Share Earnings	% Increase	Aver. Incr. In Sh. Earns. 1951-56	Price-Earns. Ratio	Div. Payout	Approx. Common Stock Equity
2	O	Concord Elec.	44	2.40	5.5	2.71**	3	2	16.2	89	61
71	O	Connecticut Lt. & Pr.	18	1.00	5.0	1.12Ap	D6	7	15.9	88	39
23	O	Connecticut Power	40	2.25	5.6	2.84Ma	D2	4	14.1	79	41
522	S	Consol. Edison	43	2.40	5.6	3.15Ma	D2	8	13.7	76	39
208	S	Consumers Power	48	2.40	5.0	3.16Ap	D4	6	15.2	76	43
74	S	Dayton P. & L.	47	2.40	5.1	3.81De	13	8	12.3	63	38
39	S	Delaware P. & L.	49	1.80	3.7	2.64Ma	9	10	18.6	68	35
237	S	Detroit Edison	42	2.00	4.8	2.51Ap	12	8	16.8	80	46
130	A	Duke Power	30	1.20	4.0	1.90De	5	20	15.8	63	52
95	S	Duquesne Light	37	2.00	5.4	2.42Ma	D1	4	15.3	83	34
31	O	Eastern Util. Assoc.	32	2.20	6.9	2.52Ma	D5	0	12.7	87	34
2	O	Edison Sault Elec.	16	.80	5.0	1.09Ma	D10	13	14.7	73	42
12	O	El Paso Elec.	23	1.00	4.3	1.42Ma	14	8	16.2	70	41
12	S	Empire Dist. Elec.	20	1.20	6.0	1.63Ma	10	3	12.3	74	31
5	O	Fitchburg G. & E.	50	3.00	6.0	3.65De	4	3	13.7	82	45
49	S	Florida Power Corp.	58	1.80	3.1	2.93Ma	26	19	19.8	61	32
110	S	Florida P. & L.	57	1.28	2.2	2.70Ma	24	25	21.1	47	38
189	S	General Pub. Util.	39	2.00	5.3	2.93Ma	2	12	13.3	68	40
6	O	Green Mt. Power	15	1.00	6.7	1.22Ma	D1	7	12.3	82	36
56	S	Gulf States Util.	40	1.60	4.0	2.28Ap	5	14	17.5	70	32
22	A	Hartford E. L.	56	2.88	5.1	4.08Ma	D5	12	13.7	71	49
5	O	Haverhill Elec.	40	2.35	5.9	2.67De	2	—	15.0	88	100
21	O	Hawaiian Elec.	45	2.50g	5.4	3.32Ma	6	—	13.5	77	36
78	S	Houston L. & P.	59	1.60k	2.7	2.56Ap	D4	20	23.0	63	46
8	O	Housatonic P. S.	22	1.40	6.4	1.43De	1	0	15.4	98	53
27	S	Idaho Power	39	1.40	3.6	2.19Ma	12	7	17.8	64	36
82	S	Illinois Power	29	1.50	5.2	1.89Ma	4	6	15.3	79	35
43	S	Indianapolis P. & L.	30	1.50	5.0	2.09Ma	7	5	14.4	72	39
20	S	Interstate Power	14	.80	5.7	1.04Ma	—	3	13.5	77	30
33	O	Iowa Elec. L. & P.	28	1.50	5.4	1.99Ap	D10	10	14.1	75	31
39	S	Iowa-Ill. G. & E.	31	1.80	5.5	2.42Ma	1	3	12.8	75	41
37	S	Iowa Power & Light	27	1.60	5.9	2.04Ma	D6	2	13.2	78	35
32	O	Iowa Pub. Serv.	15	.80	5.3	1.08Ap	D4	5	13.9	74	35
13	O	Iowa Southern Util.	21	1.28	6.1	1.69Ap	D1	8	12.4	76	37
56	S	Kansas City P. & L.	39	2.00	5.1	2.79Ap	3	8	14.0	72	35
30	S	Kansas G. & E.	31	1.32	4.3	2.28Ap	21	12	13.6	58	29
45	S	Kansas Pr. & Lt.	25	1.30	5.2	2.03Ma	7	9	12.3	64	31
37	O	Kentucky Util.	26	1.28	4.9	2.05Ma	1	9	12.7	62	34
7	O	Lake Superior D. P.	24	1.20	5.0	1.65Ma	2	6	14.5	73	38
6	O	Lawrence Electric	29	1.75	6.0	1.87**	34	D	15.5	94	62
98	S	Long Island Ltg.	23	1.20	5.2	1.45Ma	D5	6	15.9	83	32
52	S	Louisville G. & E.	30	1.10	3.7	1.88De	4	4	16.0	59	40
8	O	Lowell Elec. Lt.	54	3.00	5.6	3.37De	D8	D	16.0	89	58
9	O	Lynn G. & E.	33	1.60	4.8	2.10De	3	8	15.7	76	77
9	O	Madison G. & E.	45	1.80	4.0	4.08Ma	NC	11	11.0	44	50
4	A	Maine Pub. Serv.	17	1.08	6.4	1.35Ap	31	3	12.6	80	33
5	O	Michigan G. & E.	45	1.60b	6.6b	4.05Ma	7	14	11.1	40	37
159	S	Middle South Util.	37	1.60	4.3	2.25Ma	15	4	16.4	71	34
28	S	Minnesota P. & L.	26	1.40	5.4	2.15Ap	—	6	12.1	65	36
2	O	Miss. Valley P. S.	30	1.40	4.7	2.14Ma	D14	3	14.0	65	31
12	A	Missouri Pub. Serv.	13	.72h	5.5	.94Ap	—	20	13.8	77	33
6	O	Missouri Util.	24	1.36	5.7	1.80Ma	D1	2	13.3	76	32
39	S	Montana Power	45	1.80	4.0	3.59Ma	6	6	12.5	50	37
142	S	New England Elec.	17	1.00	5.9	1.27Ma	—	0	13.4	79	34
44	O	New England G. & E.	17	1.05	6.2	1.41Ma	—	5	12.1	74	42
45	O	New Orleans P. S.	45	2.25	5.0	2.63Ma	2	0	17.1	86	38
2	O	Newport Elec.	18	1.00	5.6	1.40Ja	16	4	12.9	71	30
83	S	N. Y. State E. & G.	39	2.00	5.1	3.04Ap	1	8	12.8	66	39
244	S	Niagara Mohawk Pr.	31	1.80	5.8	2.07Ma	D8	4	15.0	87	33
81	O	Northern Ind. P. S.	40	1.92	4.8	2.92Ma	4	7	13.7	66	35
139	S	Nor. States Power	17	.90	5.3	1.20Ma	3	8	14.2	75	34
9	O	Northwestern P. S.	17	1.00	5.9	1.26Ma	D12	3	13.5	80	26
129	S	Ohio Edison	52	2.64	5.1	3.51Ma	D4	9	14.9	75	44
48	S	Oklahoma G. & E.	44	1.80	4.1	2.45Ma	11	9	18.0	73	35
15	O	Otter Tail Pr.	27	1.60	5.9	2.20Ma	—	7	12.3	73	38
471	S	Pacific G. & E.	50	2.40	4.8	3.36Ma	D1	13	14.9	71	35

Annual Rev. (Mill.)		(Continued)	5/29/57 Price About	Dividend Rate	Approx. Yield	Recent Share Earnings	% Increase	Aver. Incr. In Sh. Earns. 1951-56	Price-Earns. Ratio	Div. Payout	Approx. Common Stock Equity
48	O	Pacific P. & L.	32	1.60	5.0	2.10De	17	8	15.2	76	29
129	S	Penn Power & Lt.	44	2.40	5.5	3.32Ma	9	11	13.3	72	28
225	S	Phila. Elec.	40	2.00	5.0	2.65Ma	9	6	15.1	75	43
35	O	Portland Gen. Elec.	25	1.20	4.8	1.80Ma	5	6	13.9	67	36
64	S	Potomac Elec. Pr.	22	1.10	5.0	1.58Ma	5	8	13.9	70	39
83	S	Pub. Serv. of Colo.	47	1.80i	3.8	2.68Ma	8	8	17.5	67	39
300	S	Pub. Serv. E. & G.	30	1.80	6.0	2.15Ma	D11	—	14.0	84	38
75	S	Pub. Serv. of Ind.	39	2.00	5.1	2.61Ma	10	4	14.9	77	36
29	O	Pub. Serv. of N. H.	17	1.00	5.9	1.41Ma	13	13	12.1	71	32
12	O	Pub. Serv. of N. M.	15	.80	5.3	1.18Ma	15	7	12.7	68	37
25	S	Puget Sound P. & L.	30	1.36	4.5	1.72Ma	10	10	17.4	79	61
58	S	Rochester G. & E.	29	1.60	5.5	2.24Ma	5	10	12.9	71	35
19	O	Rockland L. & P.	19	.80	4.2	1.05De	9	11	18.1	76	30
8	S	St. Joseph L. & P.	25	1.40	5.6	1.92Ma	12	7	13.0	73	40
51	S	San Diego G. & E.	21	.96	4.6	1.46Ma	6	6	14.4	66	40
8	O	Savannah E. P.	22	1.00	4.5	1.36Ma	12	4	16.2	74	30
9	O	Sierra Pacific Pr.	22	1.20	5.5	1.97Ma	31	14	11.2	61	27
195	S	So. Calif. Edison	51	2.40	4.7	3.20Ma	D5	3	16.0	75	37
43	S	So. Carolina E. & G.	23	1.10	4.8	1.37Ma	NC	20	16.8	80	36
7	O	Southern Colo. Pr.	15	.70	4.7	1.29De	3	9	11.6	54	43
228	S	Southern Co.	25	1.10	4.4	1.48Ap	4	10	16.9	74	35
16	S	So. Indiana G. & E.	32	1.60	5.0	2.06Ma	6	5	15.5	78	35
7	O	So. Nevada Power	19	1.00	5.3	1.58Ma	15	15	12.0	63	34
1	O	Southern Utah Power	17	1.00	5.9	1.55Ma	52	1	11.0	65	39
3	O	Southwestern E. S.	20	1.16	5.8	1.64N	—	4	12.2	71	27
39	S	Southwestern P. S.	33	1.40	4.2	1.71Ap	17	4	19.3	73	30
26	A	Tampa Elec.	34	1.20	3.5	1.65Ap	18	14	20.6	73	36
146	S	Texas Utilities	49	1.44	2.9	2.43Ap	18	15	20.2	59	38
40	S	Toledo Edison	13¼	.70	5.2	1.02Ma	D6	5	13.2	69	29
14	O	Tucson G. E. L. & P.	36	1.40	3.9	2.11Ma	34	14	17.1	66	35
122	S	Union Elec. of Mo.	29	1.52	5.2	1.70De	—	11	17.1	89	36
33	O	United Illuminating	24	1.30	5.4	1.61De	—	7	14.9	81	48
5	O	Upper Peninsula Pr.	27	1.60	5.0	2.00Ma	D8	10	13.5	80	37
41	S	Utah Power & Lt.	29	1.20	4.1	1.73Ap	5	9	16.8	69	43
118	S	Virginia E. & P.	26	1.00	3.8	1.44Ma	9	14	15.3	69	34
26	S	Wash. Water Power	36	1.88	5.2	2.33Ma	8	14	15.5	81	41
132	S	West Penn Elec.	28	1.50	5.4	2.07Ma	D1	9	13.5	72	33
64	O	West Penn Power	50	2.40	4.8	3.12Ma	D5	13	16.0	77	33
11	O	Western Lt. & Tel.	34	2.00	5.9	2.98Ma	5	10	11.4	67	33
26	O	Western Mass. Cos.	42	2.20	5.2	3.12Ap	D3	10	13.5	71	56
105	S	Wisc. El. Pr. (Cons.)	33	1.60	4.8	2.41Ma	D1	5	13.8	67	40
40	O	Wisconsin P. & L.	27	1.28	4.7	1.94Ma	11	4	13.9	66	36
37	S	Wisconsin P. S.	22	1.20	5.5	1.83Ma	4	6	12.0	66	36
		Averages			5.0%			9%	14.7	72%	
		Foreign Companies									
203	S	Amer. & Foreign Pr.	16	$1.00	6.3%	$2.09De	—	2%	7.6%	48%	47%
139	A	Brazilian Trac.	9	.75n	8.3	1.18**	D7%	D	7.6	64	72
68	A	British Columbia Pr.	54	1.20	2.2	2.34De	14	27	23.1	51	27
17	A	Gatineau Power	32	1.40	4.4	2.28De	15	15	14.0	61	31
35	O	Mexican L. & P.	15	—	—	1.67De	D7	62	9.0	—	46
13	A	Quebec Power	30	1.20	4.0	1.99De	15	14	15.1	60	52
54	A	Shawinigan Wtr. & Pr.	98	1.80	1.8	4.25De	22	26	23.1	42	40

A—American Stock Exchange. B—Boston Exchange. O—Over-counter or out-of-town exchange. S—New York Stock Exchange. Ja—January; F—February; Ma—March; Ap—April; My—May; Je—June; Jy—July; Au—August; Se—September; Oc—October; N—November; D—December. *Based on average number of shares. **Calendar year 1955. a—Estimated annual rate. The "A" stock received stock dividends. b—Also 3 per cent stock dividend December 31, 1956, which is included in the yield. c—Also 2 per cent stock dividend January 10, 1956. f—Also 5 per cent stock dividend August 15, 1956. g—Cash dividends of $2.50 in 1956 included 30 cents extra; 10 per cent stock dividend also paid April 30, 1956. h—Also stock dividend of one share for each 200 shares held September 12, 1956. i—Also 10 per cent stock dividend November 16, 1956. j—Also 10 per cent stock dividend August 31, 1956. k—Also 5 per cent stock dividend December 17, 1956. m—Also 2 per cent stock dividend January 10, 1956; 3-for-2 split June 15, 1956. n—Also 5 per cent stock dividend December 28, 1956.

What Others Think

State Regulation of Atomic Energy

THE Joint Committee on Atomic Energy is giving increasing consideration to the problem of where and how the states should fit into the pattern of regulating the peacetime atom, according to Senator Clinton P. Anderson of New Mexico, member and former chairman of the Joint Committee. Anderson told a luncheon meeting of the Council of State Governments in Chicago last month that "it is high time for the state governments to take an interest in, and start making studies and preparations for the regulation of this new industry." At the same time, Anderson believes the time is not yet ripe for the Atomic Energy Commission to put itself out of business and to delegate final responsibility to the states in this technical and complicated area, with its close relationship to the public health and safety.

Anderson said that for the time being he agrees with the AEC's position that there is now no good reason for unnecessarily burdening persons subject to AEC licensing requirements to dual licensing proceedings with regard to the same aspect of their activities. He pointed out that most of the states have not yet had a chance to build up a skeleton staff of atomic experts, much less a complete organization to do the job. But this situation is just one more reason, Anderson said, why the AEC licensing procedures and organization must live up to the highest possible standards. This was the essence of a study recently made by the Joint Committee on AEC procedures and organization in the licensing of reactor facilities. Findings of the study were included in a report reviewed by this department in the May 9th issue of the FORTNIGHTLY.

THE AEC report found a need for public hearings in certain reactor license applications and the establishment of an advisory committee on reactor safeguards as a statutory committee with provisions for making some of its reports public. These suggestions have been embodied into the insurance indemnity bill, which has been favorably reported to the House and Senate by the Joint Committee.

Anderson had high praise for the model bill which the Council of State Governments has recommended that the various states adopt. The bill encourages studies and surveys to overhaul old state statutes and bring them into line with the complex and unique problems of regulating atomic energy. It also establishes a co-ordinator of atomic development activities and au-

thorizes co-operation with the AEC in inspection activities.

"More thought and studies by state experts of existing state laws—as related to atomic energy development and regulation—are most certainly needed," Anderson said. "As your recommended bill recognizes, surveys should be made in each state of the statutes relating to public health, labor, workmen's compensation, public highways, public utilities, insurance, conservation, and so on. Nobody should do this job for your state. As we all know, each state has its own separate statutes and its own sovereign power to amend its old laws or brew a whole batch of new ones."

BUT Anderson recognizes that the states must begin somewhere. He suggested a two-stage legislative program: first, for the immediate future, adoption of the model and a start on training competent technical staffs; second, eventual assumption of maximum responsibility for protecting the health and safety of citizens. Anderson also approves having a co-ordinator of atomic development activities. A co-ordinator would be useful, he said, in working with the AEC and in passing information back and forth between the federal and the state level. Anderson stressed that the co-ordinator should be paid a salary, as the model bill provides, and that another state official should not be assigned his duties.

"I believe that your recommended model bill is a very good first step to take," Anderson told the meeting. "If a substantial number of states follow your recommended approach, it should promote harmony and consistency in federal-state regulation. It should simplify the task of the businessman laboring in the atomic vineyard. This bill is an excellent example of the type of pioneering work which your council can do."

Anderson noted that many people have suggested amending the Atomic Energy Act of 1954 to define more closely the line where federal regulation stops and state regulation begins. The Joint Committee, however, has received few suggestions as to how and where the line should be drawn. Last year a bill was introduced by Representative Durham (Democrat, North Carolina), now chairman of the Joint Committee, directing the AEC to relinquish jurisdiction in any portion of the health and safety aspects of AEC regulation six months after receiving a certificate from the governor of any state that it had an agency competent to regulate such aspects. Senator Anderson also introduced a bill last year which would have authorized the AEC to negotiate compacts and agreements, with the states, relating to atomic energy matters prior to submission of the compacts and agreements to Congress for approval. Such compacts and agreements, Anderson said, "would attempt to draw this mysterious and elusive line which we have been discussing defining those areas in which the AEC found the states competent to exercise regulatory powers."

ANDERSON introduced this measure for the purpose of submitting it to the states and getting the ideas of state officials as to the type of legislation which should be enacted to provide co-operation between the states and the federal government. So far, the number of comments from the states have been meager. The bill has been reintroduced and the door left open for state officials to express their views, pro or con, on the bill or any other approach to the problem, Anderson said.

There is an urgent need for the states to acquire knowledge about reactors and contribute their views on legislation that comes before the Joint Committee for con-

sideration, Anderson continued. The Dresden reactor, to be built 45 miles south of Chicago, is an example. What if it should explode or run away? the Senator asked. "What happens to the lives of hundreds of thousands, possibly several million citizens who might be in the direct path of any radiation or fallout from such a catastrophe? Isn't that your problem?" Even if the lives should not be affected by such a disaster, there is the possibility of millions of dollars worth of property becoming dangerously radioactive. Decontamination can be a long and difficult process, said Anderson, as was learned from experiences at the Nevada testing grounds and in the Pacific.

There is also the problem of handling radioactive wastes—a problem that presents many difficulties involving definite health hazards to citizens and calling for new sanitary engineering methods. State and local officials ought to insist upon the right of original examination of reactor plans so that they may check them or have them checked by someone familiar with reactor processes to be sure that the reactor will be reasonably safe, Anderson said. He urged the states not to abandon this work to the federal government on the ground that their staffs are not yet available. To follow such a course, he said, will mean that no staff will ever be available and all checking will be in the hands of the federal government alone.

THE states might well tell Congress right now what they will ultimately want, Anderson declared. Atomic energy is no longer a monopoly or a secret. The Act of 1954 gave new freedoms, but Anderson warned that the states can still abdicate the field to the AEC if they want to do so and surrender all responsibility to that federal agency. But, he asked, is that the best way to do it? "The states do not control the railroads or the buses; they are not in a position to control the airlines, or the television stations; they do not control the stock exchanges where the financiers operate, nor even the stockyards where farmers bring their produce. Big government, given an opening, always takes over. But surely you want to hold on to the things that the state has always looked after; namely, the body—the physical welfare—of the citizens, and their ultimate health and safety."

In this particular field of watching the personal health and safety of the people, Anderson concluded, the state should assert its rights now, even though to do this it must depend, for the present, upon the competence of the AEC and the various supervisory boards that AEC may have. If it does not assert its rights, he warned, the day need not be far away when the state's rights will pass permanently to the federal government, and the state will not have even a trading stamp which it can ultimately redeem.

Bell Science Programs Unique in Television

WHEN popular science was first proposed as a subject for Bell telephone televising, six years ago, hardly anybody in Bell management thought that it could be converted into successful entertainment. Those who did see possibilities had no idea as to how it could be done.

In November, "Our Mr. Sun" was televised nationally, the first one-hour color program in the Bell science series. It dealt with Man's advancement in solar science from the days when the sun was worshiped as a god, down to our own time, of atomic science and the direct utilization of solar energy.

This program was seen by an esti-

mated 24 million viewers, and was definitely popular as entertainment.

In March, a second program was televised, "Hemo the Magnificent," dealing with the circulation of the blood. It also was popular; and other scientific subjects to be treated, probably in two programs a year, will be drawn from physical, astronomical, chemical, biological, psychological, and other fields. The "Sun" program was selected from more than thirty subjects.

Most television activities of large corporations, lavishly financed, have advertising and selling angles, direct or otherwise.

These Bell science programs have no selling objective at all, as far as telephone service is concerned. They have hardly any "commercial," like the talk on phone service that is part of the Bell radio telephone hour. While the "Sun" program was in preparation, Bell Laboratories were able to announce their first results in solar battery experiments for the direct conversion of sunlight into electricity. This was obviously an important late chapter in Man's investigations of the sun, and had to be included in the program. But as the mystery writers say, it was "purely coincidental."

WHAT these programs were designed to *sell* is science, as a public service to the nation, especially to young people in the decisive years when they are going through college, and considering careers. Repeated surveys among these youngsters have shown that they regard science as stuffy, and unrewarding, compared with the professions and business. There is a shortage of young people with scientific and technological education, and ambitions. It is felt particularly in the telephone industry. It will be felt more tomorrow, in that and all industry, as the American economy becomes more complex through automatization.

Some Bell executives believed that science, with intelligent television treatment, had entertainment possibilities, and would be welcomed by the general public.

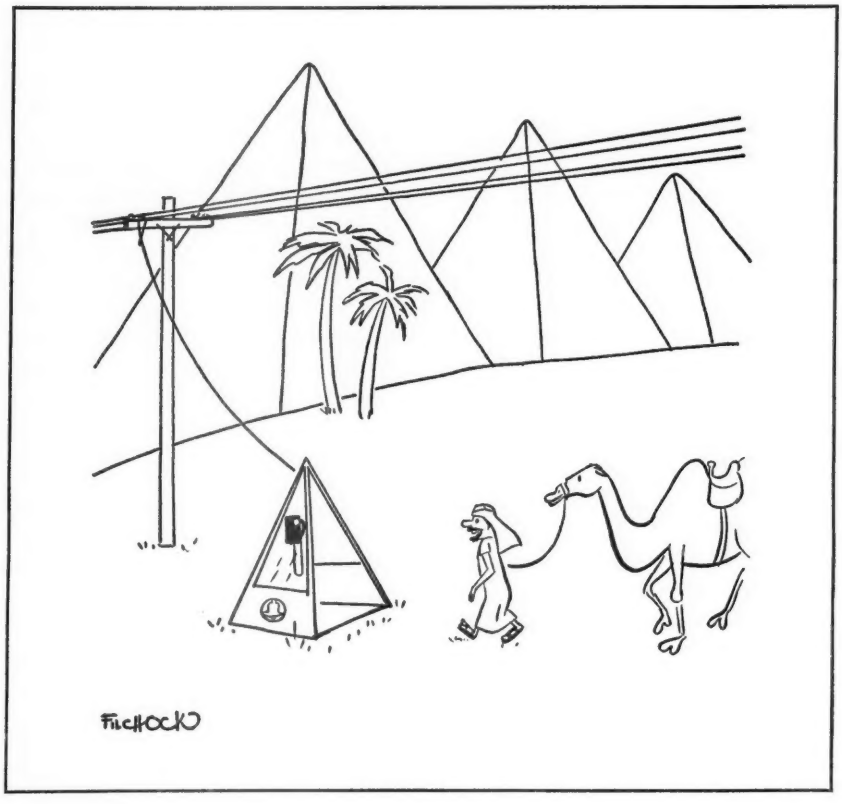
"Science is the great adventure of our time—I might say all time," said Cleo F. Craig, former chairman of the AT&T board.

"Every person alive is a scientist in some way, because science is the basic spark of curiosity in all of us," said Frank Capra, later chosen to direct the programs. "I like to think of science as the process of discovering what God created."

A general outline of treatment was drawn up as early as 1951, by Mr. Craig, and Bartlett T. Miller, then vice president of Bell public relations. The programs must be of highest quality, completely authentic, acceptable to scientists as well as the general public; should interest the average viewer, but not overpopularize or "talk down"; must not risk offending; must cover all fields of science, not just the telephone business.

It was also decided that the actual television showing would be just the start of a continuous program in schools and before general audiences. This is an innovation in corporation television, where as a rule the most expensive and popular programs, such as "spectaculars," and complete stage productions, are seen once and for all. The Bell series was designed for prints, available for regional company circulation, and to anybody that applied for them.

AS a start in production, many scientists, science editors and writers were consulted in 1952 for their suggestions and their criticisms of suggested programs. Twenty different treatments of full hour-long programs were prepared, and fifty



half-hour programs. A complete shooting script on the subject of "Flight into Space" was developed, to explore possible techniques.

Consideration was also given to production, and various directors interviewed, with the final choosing of Frank Capra, who is a chemical engineer, three times a Motion Picture Academy award winner, and who during the war devised unique techniques for the Armed Forces, for training by films. He was signed up in 1952, four years before the showing of "Our Mr. Sun."

This first program began to take shape in 1954, when it was privately previewed to more than fifty groups of scientists, educators, students, and general audiences. It was also sneak previewed in California as a regular theater feature, for its entertainment value, and in all these test showings the reactions were favorable.

THE scientific knowledge Man has gained about the sun was, of course, bewildering in its abundance, and imposed a severe task of selection. Some of this knowledge was photographic, as pictures of the sun's fiery geysers, 5,000 to 10,000 miles high, and one of the greatest recorded solar explosions. Every day the sun sends the earth as much energy as mankind uses in a year. That is all the energy Man has. He is free to use as much of it

as he can harness through scientific research.

ONCE, the sun was "Ra," father of all the Pharoahs, worshiped as a hawk-headed god. Hardly a generation ago the sun was a mystery to science, which had not yet discovered that its fuel was atomic. Today, we know that it is a primal atomic reactor, and are working to scale it down to our own size.

This abundance of scientific material had to be turned into an hour's entertainment. For that a story was needed. It took the shape of a human being, played by an actor, who approached Mr. Sun for more information about himself. Mr. Sun was not pleased. He remembered the ages when Man worshiped him, and now here was Man subjecting him to human analysis—a third degree! However, in the end Mr. Sun came to admire Man's scientific spirit, and was co-operative.

This little plot was unfolded partly by animation, with a couple of hundred thousand drawings in all—it takes a thousand for each program minute. The analysis of scientific data, and story, and the working out of animation sequences were complex projects in themselves.

There were some problems connected with the popularization of fine scientific information through typical entertainment devices. But general audiences like a story, and entertainment devices build such audiences.

THE second film, "Hemo the Magnificent," told a story, and was likewise animated. Until Harvey discovered its circulation, a little more than 300 years ago, the blood, too, was regarded as magical. Slow motion was utilized to exhibit the heating of the human heart, with microscopic views of animals' blood in circulation. Animated sequences illustrated the blood energizing all parts of the human body, and there was a presentation of the theory that the composition of blood is an evolution from sea water. The effect of shock on circulation was shown, and the further objectives of blood research, to discover the causes of gradual hardening of the arteries and other effects not yet understood. Science does not yet know what makes the heart beat.

The televising of these films is only a beginning. More than 400 prints of the sun story are in circulation in schools and other fields, the full one-hour length, and versions of forty minutes. This is a circulation different from that of other big business television programs, most of which are not adapted to such secondary audiences. Ultimately, the secondary showings may reach larger audiences than the original TV showing.

"POPULAR science" generally means to the reader or viewer a sugar-coating for a pill of something out of the mysterious laboratories that he ought to know about.

The Bell series takes a very different stand. Science is something to know about in a remarkable new world where you will presently be living—have already begun to live. These films are to show science at work in great fields like astronomy, geology, biology, anthropology, mathematics—even weather and probabilities. As Frank Capra says, science is full of adventure stories that grip the heart and mind. Scientists at work on the great problems of Man's existence, as "pure" knowledge for its own sake, and "applied" science that can be immediately utilized, are the theme, and by watching, viewers gain new ideas about their world, and the practical everyday part science plays in it.

For one glimpse, see what is coming in the telephone business, as outlined in a talk

by Frederick R. Kappel, Bell president.

Local telephony still requires a separate circuit for every phone to a central station, although over toll lines it is now common practice to send multiple messages. Before long, multiple talks will be sent over the same local trunk—adding another subscriber will be adding another wave length.

By devices like the transistor, and others still in the laboratories, such as tubes called "wave guides," and millionth-second pulsations interleaved, it will be possible to transmit as many as 400,000 messages over the same wire simultaneously, and the messages can be conversations, written words, pictures, music—whatever is to be sent. Machines will transmit data to other machines in masses, a service for which business will find many uses.

One of the present management problems in telephony is keeping expensive toll trunks profitably occupied. The effect on revenues when a single trunk can carry so much traffic is something to be imagined.

ELECTRONIC switching is due to start in a couple of years, and then, instead of dialing for many numbers, the subscriber will be connected automatically by "memory tubes" that take his lists of regular calls, and do the switching. Next to transmission, telephone management is concerned with switching, for which it has to build all the central stations, and rely upon the accuracy and speed of the customer. With electronic switching the sales manager who calls up a dozen branches every morning will store his list with a tube, and be connected automatically. Memory devices can be short term, for lists like that, and long term, storing locations of conduits, cables, and other business information. A postal-size photo plate can carry as many as a quarter-million items of information, solving problems of files and file girls.

Phones with pictures of the parties speaking are technologically here. The images at first will be small, and conveyed at two per second, compared with the thirty images of television. They will be black and white, but recognizable, and conveying expression. Judging from television experience, the customers will immediately begin thinking of larger pictures, and color.

Looking further ahead, and out over the world, General David Sarnoff, of the Radio Corporation of America, predicts atomic energy and energy from sunlight, for jet and rocket transportation, putting great cities minutes apart; units that will supply electricity for a home through a lifetime using nuclear wastes; electronic air conditioning utilizing the principle of temperature change occuring between the joints of two metals; cold light obtained by passing light through substances that eliminate heat, glare, and shadow; world-wide color television relayed by earth satellites, that will be home recorded in color on wire or magnetic tape.

A changed world, already in the laboratories, that will require armies of changed human beings to research, invent, construct, maintain, and adapt the equipment to new needs.

INDUSTRY today is asking for five to ten times as many college graduates as ten years ago. What the need will be ten years from now is probably not predictable, in numbers or kinds of education. But there will have to be far-reaching preparation. The Bell science series is basically concerned with preparation.

While it is taken for granted that science has settled its conflict with religion, there is another conflict being waged on college campuses, says J. R. Killian, Jr.,

president of Massachusetts "Tech." That is with the liberal arts. Proponents of the humanities in education have tagged science as vocational and antihumanistic, the student electing it being regarded as a mere job hunter, and technologist, lacking the broader aspects of life. This latent antagonism has brought scientific education to a near collapse. Proponents of scientific education, on the other hand, maintain that a liberal education cannot be liberal without science. The humanities are being taught in scientific courses, and it is held that a balanced education, in keeping with conditions in the immediate future, will be scientific, with the humanities added.

From the standpoint of business today, the technological graduate in his first job will be unable to forecast his career. For his work will change repeatedly. He will need education for what may come, which is true education. Along this line, there is the immediate change that might come in defense activities. More than half of all scientists and technologists employed are said to be in these activities. The changes in employment that would come with a reduction of the defense burden would call for the highest adaptability in scientific workers.

A DIFFERENT standpoint on "popular" science, and highly specialized, was adopted some years ago for General Electric's educational publications. Although these include a group of "comic books," there is no thought of entertainment, or interesting the general public. Nothing is broadcast, entire reliance being upon the printed word—and a very skillful use thereof.

The audience is made up of science, mathematics, and social teachers, and students in junior and senior high schools. The material is pamphlets, supplied without cost to teachers in class lots, on order. For the teachers, these assist in class work, and in vocational guidance, and for students they are supplementary reading that keeps science up to date, ahead of the textbooks, and aid in selecting studies and planning careers.

GE has always been a large employer of college graduates, and out of its experience knows what kinds of ability are needed in industry generally, and understands the hard study necessary to qualify. It speaks to young people in their critical college years with facts, not arguments.

Typical is a pamphlet titled "General Electric's Answer to Three Why's."

Why Study Math? Everybody needs math; some get along with a little arithmetic; others must have algebra, geometry, trig, calculus. There is math in every job, even in a business of your own. The time to get your math is in high school, for it will be harder to catch up later. Another pamphlet, "Math at General Electric," poses actual job problems encountered in their work by GE mechanics, engineers, office, sales, and advertising people, all solvable by the mathematics studied in high schools.

Why Study Science? General Electric has, and in management positions, at least 20,000 scientists and technologists. Obviously, they have learned something about scientific education for careers. Their experience has been summarized for students. Everybody needs some science, even in the most elementary work. Science in school is not more important than English, history, or athletics, but, like these, can be a base from which will grow a lifetime of progress and interest.

Why Look into Engineering? The word "engineer" includes scientist, physicist, chemist, metallurgist, and other technologies. Engineers are taught to think.

An engineering education fits men and women for a great variety of careers—for example, four out of every ten executives in management are engineer-trained. Engineering is the third largest profession, following teaching and nursing, is not crowded, and not likely to be in the foreseeable future.

Another pamphlet deals with four "Why's" likely to be asked by students: Why stick to your studies? Why work? Why study English? Why read? Another asks, "What do you think about? Why think for yourself? Why get along with others? Why bother about politics?" Still another is a quiz paper on career planning: Why worry about a career? Are you sure you can go to college? Three steps to college admission. These pamphlets deal with questions that students are pondering, are encouragement for them in the heat of their educational battle.

Two pamphlets dealing with the company's own research tell the story of the turbine, and the story of GE laboratory achievements. While GE is engaged primarily in the electrical industry, and its educational material gives an interesting picture of that industry, the emphasis is upon scientific schooling as preparation for the world today, and tomorrow.

FOR classrooms, libraries, and other points of contact with high school students, GE publishes "progress posters" that give scientific and engineering information later than that in textbooks. They are for display, and come out twice a month during the school year.

For visual teaching, GE has a number of motion picture films dealing with science, social studies, home economics, industrial arts, and agriculture, available from GE libraries over the country. These are selections from company films made for training and other purposes. Some are in color, others have animation, and all are in constant circulation in schools, colleges, churches, and various organizations. They all reflect the scientific viewpoint toward life.

THE GE "comic books" are true to the form of the familiar ones, snitch-read by youngsters while the newsstand owner is busy elsewhere. They are printed in crude colors, on pulp paper, tell the conventional picture stories to wondering youngsters, and are written by experienced comic book authors.

But they are pitched to high school youngsters, telling the stories of atoms, electricity, light, power, electronics, and science as part of our daily lives, its development from the most rudimentary beginnings in philosophy and alchemy, and its promises for the future.

—JOHN MAPPELBECK

"NEITHER nuclear power nor solar energy is going to be, in the immediate future, the solution to any serious depletion of our current supply of fossil fuels—or, for that matter, of any great consequence in our total energy demands. We may expect by the year 2000 that nuclear and converted solar energy in use will contribute about 10 per cent of our then total energy requirement and will essentially offset the expected reduction in petroleum energy supply."

—WALLACE R. BRODE,
Associate director, National Bureau of Standards.

The March of Events

EEI Convention

THE twenty-fifth annual convention of the Edison Electric Institute actually got under way on Sunday, June 2nd, in a preconvention press conference presided over by the president of the institute, Donald S. Kennedy, president of the Oklahoma Gas & Electric Company. Kennedy told the newsmen about the time, technical man power, and funds being devoted to the nuclear energy programs of the electric power companies, and the progress being made are substantial evidence of the industry's determination to help bring about the development of economically competitive nuclear power.

Kennedy said there are 80 investor-owned electric companies participating in 14 nuclear reactor projects of various types and sizes and one thermal nuclear reactor project. This compares with 44 companies participating in nine nuclear reactor projects a year ago. He said about $400 million is being expended by the companies.

Monday, June 3rd

At the opening general session in the Palmer House, Kennedy reviewed the progress of the institute since its founding in 1933 and referred to the theme of the convention, "The American Way to a Power-Full Future."

Major General K. D. Nichols, U. S. A. (Ret.), consultant on atomic energy and former general manager of the Atomic Energy Commission, discussed the partnership between private enterprise and the government permitted under the Atomic Energy Act of 1954. Referring to the progress of atomic power, General Nichols commented that it is rapidly becoming competitive in Europe, England, and other world areas of high fuel cost. He said it would be somewhat later before it becomes competitive in the United States, probably commencing in our own high-cost fuel areas, such as New England.

The third speaker on the first general session program was Dr. Curtis L. Wilson, dean, School of Mines and Metallurgy, University of Missouri. He discussed the importance of co-operation between industry and engineering colleges to attract and train more professional engineers and engineering teachers. He suggested that power companies offer consulting work to faculty members by way of practical assistance.

Tuesday, June 4th

At the general session of the second day, Arthur Kline, member of the Federal Power Commission, discussed the rôle of that board concerning hydroelectric development in meeting the rapidly growing power needs of America.

Another speaker on the second day was Dr. S. C. Hollister, dean of engineering, Cornell University, and one of six citizen members of the Hoover Commission on the Organization of the Executive Branch of the Government. Dean Hollister discussed public and private power and the recommendations of the Hoover Commission.

The third speaker at the session was Leonard E. Read, president, The Foundation for Economic Education, Inc. He told the meeting that wider acceptance of private enterprise cannot be brought about until its adherents themselves fully understand the private enterprise philosophy. He said the government has departed from its limited position and entered the private enterprise field to the extent that it is now taking 33 per cent of all earned income.

At the third general session, also on June 4th, H. Lester Hooker of the Virginia State Corporation Commission and dean of the state regulatory commissioners in the United States, spoke on states' rights and private enterprise. He said the American people must assume a renewed and energetic rôle in the federal government if the rights of the states to regulate and control their own internal affairs are to be preserved. He commented on the success of public utility regulation but warned of developments which threaten its infringement.

Albert H. Gordon, partner, Kidder, Peabody & Company, of New York city, spoke on the availability of capital for the electric industry. So far, he said, there is no reason to believe that funds will not be available at a reasonable cost, but that the only cloud on the horizon is the threat of inflation which could raise havoc with financing and growth of the nation's industry and economy as a whole.

Dr. Claude Robinson, president of Opinion Research Corporation, Princeton, New Jersey, told the convention that eight national audits of public thinking show a substantial increase since 1943 in favor of private ownership of electric utilities. He added, however, that the public is not well-informed on the activities of these companies in the atomic energy field and that few people know about the preference clause or the favored tax status of government power agencies.

Wednesday, June 5th

Harllee Branch, Jr., president of The Southern Company, Atlanta, Georgia, opened the fourth general session on June 5th, with further reference to the battle of the industry to prevent government encroachment in the electric power field. He said that new technological developments are being used as a basis for demands for further federalization. It is a tough battle, he said, but with courage and leadership it can be won.

Mr. Branch saw in the recent critical attacks against the industry's effort to publicize "the truth about public power and its hidden subsidies" an effort to "gag" the public utilities. He said this is "a confession on the part of the government power exponents that they cannot peddle their antiutility poison to an informed and alert citizenry."

Thomas D'Arcy Brophy, chairman, Kenyon & Eckhardt, Inc., of New York city, spoke on selling ideas to the American people. He said there is a great opportunity to extend the usefulness of mass communication in the interest of the public.

Allen S. King, president, Northern States Power Company, Minneapolis, discussed management's responsibility for safety. He said it is a personal matter—a human thing—which must depend on the attitude and motivation of management, reflected throughout industrial organization.

George W. Ousler, vice president, Duquesne Light Company, awarded various industry prizes to conclude the fourth general session.

Edwin Vennard, vice president and managing director of the institute, opened the final afternoon general session with an analysis of the attitude of the American people towards Socialism. Most of them are opposed to it, he said, but due to a lack of information there is a trend to Socialism.

Kinsey M. Robinson, chairman of the board and president, The Washington Water Power Company, spoke along the same lines in discussing consumer attitudes towards the electric industry. In a fighting speech he urged the industry to take a more courageous step to reach the public, not only with a day-to-day story of service but with factual information about the more serious problems of Americanism and survival.

Donald S. Kennedy was re-elected president of the institute for another year. Other officers, also re-elected, were: vice president, J. W. McAfee of the Union Electric Company; vice president and managing director, Edwin Vennard; treasurer, H. S. Sutton, Consolidated Edison Company of New York, Inc.; and secretary and assistant managing director, A. B. Morgan.

Fifteen new members of the board were elected, with terms expiring in 1960. They are: Walter Beckford, president, Cincinnati Gas & Electric; W. C. Bell, president, United Illuminating; N. A. Cooke, president, Duke Power; James F. Davenport, executive vice president, Southern California Edison; T. W. Delzell, chairman, Portland General Electric; G. S. Dimwiddle, president, New Orleans Public Service; Willis Gale, chairman, Commonwealth Edison; M. L. Kapp, president, Interstate Power; W. T. Lucking, president, Arizona Public Service; W. W. Lynch, president, Texas Power & Light; L. C. McClurkin, president, Savannah Electric & Power; John J. McDonough, president, Georgia Power; A. R. Schiller, president, Public Service Company of New Hampshire; G. W. Van Derzee, chairman, Wisconsin Electric Power; and J. Theodore Wolfe, president, Baltimore Gas & Electric.

Arkansas

Gas Rate Increase Allowed

A TWO-YEAR battle over industrial gas rates charged by Arkansas Louisiana Gas Company ended recently with the utility being allowed a $4,354,559 annual rate increase.

The state public service commission, acting under a mandate from the state supreme court, ordered the increase at the identical rate of 17.92 cents per thousand cubic feet that it had determined in the original proceeding in November, 1955.

At the same time, the commission ruled that the company did not have to make any refunds and that the utility should be released from the bonds under which the increased rates had been collected since the litigation began.

At the time the commission issued its order only one of the original 11 protestants of the rate schedule, Columbian Carbon Company, still was an active party to the litigation. All of the others had withdrawn prior or subsequent to the supreme court's ruling in the case and had signed long-term contracts with Arkansas Louisiana at an average rate actually higher than the one allowed by the commission in the first place.

California

Data on Utility Service Fees Ordered

An investigation into service charges by utility companies for extension of gas and electric lines to private homes was ordered last month by the state public utilities commission.

Commission President Peter E. Mitchell said there had been some confusion over a formula by which the cost of extending services to new subdivisions is allocated. Declaring that rapid population growth and changing economic conditions made the study necessary, Mitchell added that the subdivider pays part of the cost and the customer the balance. "We want to find whether the balance paid by the customer is proper."

Ten companies were asked to submit data by August 1st. They were Pacific Gas and Electric Company, California-Oregon Power Company, California-Pacific Utilities Company, California Electric Power Company, San Diego Gas & Electric Company, Sierra Pacific Power Company, Southern California Edison Company, Southern California Gas Company, Southern Counties Gas Company, and Southwest Gas Corporation.

Kentucky

Seeks Electric Rate Adjustments

Kentucky Utilities Company recently asked the state public service commission for authority to make electric rate adjustments that will add about two cents a day to the average residential customer's electric bill beginning July 1st. It is the company's first rate increase in thirty-seven years.

KU President R. M. Watt pointed out that increased costs of fuel, equipment, and labor since World War II have more than offset the savings from operating efficiencies and economies made possible by the greater use of electricity throughout KU's operating area.

Watt said the total increase from the proposed rate adjustments—about $2,505,000 a year—would be used to provide additional and better service to the company's customers, to improve facilities, and insure continued efficient service.

Maine

Rate Law Change Approved

A bill removing "current value," or reproduction cost, as one of the factors the state public utilities commission must consider in evaluating the properties of public utilities for rate-making purposes was given final passage by the state legislature late last month and sent to the governor for signature.

Advocates of the measure contended that the mandatory consideration of the "current value" factor had tended to inflate utility rates.

Massachusetts

Bill Requiring Woman Commissioner Rejected

A bill which would have required a woman member on the state public utilities commission was rejected by the state senate recently. Under present Massachusetts law, the governor may appoint any qualified person to the commission.

Rejected earlier by the state senate was a bill which would have required appointment of a representative of labor to the utility regulatory agency.

Nebraska

Public Power Tax Bill Killed

A BILL that would have required public power districts to pay property taxes was killed by the state legislature's judiciary committee last month following a public hearing.

Power districts in Nebraska now pay in lieu of taxes on property acquired from private owners. Such payments equal the amount paid in taxes in the last year of private ownership.

The rejected measure, listed as LB 607, proposed that the people vote next year on a state constitutional amendment authorizing the state legislature to provide for direct taxation instead of the payments in lieu of former taxes. Power district spokesmen expressed fear at the hearing that the districts would be forced to pay much more than under the present in-lieu arrangement.

The sponsor of the tax proposal was Senator Klaver of Omaha.

Texas

Governor Signs Bill

GOVERNOR Daniel recently signed into Texas law a bill to authorize electric co-operatives to serve any rural area, any area which was a rural area when service was undertaken, and any area now serviced by such corporation.

The measure had been listed as HB 547.

Utah

Oil and Gas Compact Signed

GOVERNOR George Dewey Clyde, of Utah, officially signed the "Interstate Compact to Conserve Oil and Gas" on May 28th, it was announced recently by Governor Raymond Gary, chairman of the IOCC. The compact was presented to Governor Clyde by Earl Foster, executive secretary, in the governor's office in Salt Lake City.

This officially makes Utah the twenty-seventh member of the IOCC, along with four associate members, for a total of 31 states pledged to conserve their oil and gas resources.

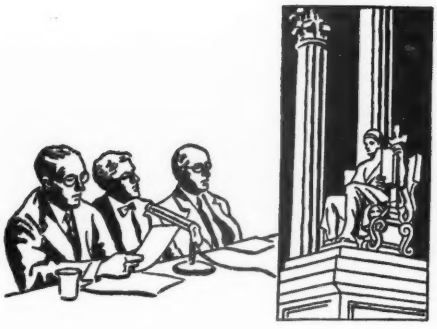
Virginia

Utility Tax Plan Opposed

THE 10-member executive board of the League of Virginia Counties adopted a resolution last month opposing the proposed change in utilities' assessment ratios and asking the state general assembly to create a commission to study the matter.

The board also asked that the assembly pass a resolution which would prevent the state corporation commission from going ahead with its announced intention to change its method of assessing public utility property.

The board of the league, membership of which is made up of 87 of the 98 Virginia counties, stated in its resolution that "if this directive is followed, the resulting loss of revenue to the various counties will bring on serious financial difficulties affecting the ability of counties to discharge their assumed obligations and have a damaging effect on the credit rating of the counties."



Progress of Regulation

Trends and Topics

Rate Case Expenses as an Operating Charge

WHILE it may be said, generally, that reasonable rate case expenses are allowable as an operating charge, the question whether a particular amount claimed is reasonable, and hence allowable, is subject to a considerable latitude of regulatory judgment, based upon the facts in each individual case. The utility, moreover, has the burden of showing that its expenditures are reasonable. These expenses are usually amortized over a 5-year period, though decisions have been noted which approve amortization periods of from two to ten years.

Allowance Depending upon Outcome of Case

"The amount of property involved, the size of the company with regard to its operation, the rate relief requested, and the need for relief at the time of filing are all to be considered in determining the propriety of the expense incurred in presenting a case," the Kentucky commission has observed (97 PUR NS 33). If a rate increase request is substantially sustained, the reasonable expense of presenting the case—not necessarily the actual outlay—will be allowed. The New Jersey supreme court sustained the inclusion of rate case expenses in operating costs though the company, which sought a rate increase of about 26 per cent, was granted only a 6 per cent increase. The court considered that the company had prevailed in substantial part (44 PUR NS 50). The Pennsylvania superior court has indicated that such expenses should be allowed, at least to the extent recoverable under the new rates, if the rates proposed are substantially upheld (51 PUR NS 129).

On the other hand, if a utility brings a proceeding for a rate increase and the increase is found to be excessive and denied, the entire expense sustained in presenting the case may be disallowed. The stockholders must bear the loss. Rate case expenses are to be recognized, said the New Jersey commission, only if the company was reasonably justified in undertaking such expenses (6 PUR3d 249).

But the general rule seems to be somewhat more liberal when a company's

rates lawfully in effect are attacked. The United States Supreme Court has held that, on a proceeding by a commission to determine the reasonableness of existing rates, the utility should be allowed reasonable expenses in presenting its side of the case, even though its rates are found to be excessive. The court indicated that it did not refer to expense of litigation in the courts; nor would its ruling apply if the company's complaint were unfounded, or if the cost of the proceeding were enlarged by untenable objections (28 PUR NS 65).

Refund Costs Disallowed

Costs incurred by a company in refunding rates collected under bond and later held to be excessive are regarded as a nonrecurring expense and have been disallowed as an operating charge. "Allowance for such expenses in the cost of service," in the words of the Arkansas commission, "frees management from the responsibility of determining reasonable rates to be established under bond and invites and might well encourage the establishment of excessive rates" (2 PUR3d 1). The New Mexico commission rejected a claim for such costs "for the very simple and basic reason that the commission could not by any stretch of the bounds of justice require the consumer to pay for the errors of the company and its management" (8 PUR3d 176).

Costs of Appeal

An appeal or other review proceeding is optional with the utility and is a calculated risk. In disallowing the costs of an appeal in a rate case, the California commission observed that the taking of an appeal is not a necessary part of due process. Such expenses, particularly where the appeal is unsuccessful, should not be charged against the ratepayers. It is a risk taken by the stockholders, the commission asserted (4 PUR3d 97).

On the basis of pertinent court decisions, the New York commission thought it "perfectly obvious" that a company's expenditures in unsuccessfully contesting a temporary rate reduction were not proper charges to operating expenses (60 PUR NS 385). In another case the commission indicated that if a utility challenges the propriety of rates fixed by a regulatory authority and thereby incurs costs sufficient to change the results from a compensatory to a confiscatory status, then such costs should not be included in operating expense for the purpose of passing upon the compensatory nature of the established rates (96 PUR NS 194). The Federal Power Commission refused to allow the estimated cost of seeking review of a rate order which had not yet been rendered. The claim was termed "entirely speculative and conjectural" (95 PUR NS 97).

In ruling upon expenditures for an appeal to the commission from a rate ordinance, the Ohio commission held that these costs, incurred to protect the business and property, must be allowed when the appeal is justified (67 PUR NS 65). The Ohio supreme court decided in an earlier case that the commission had improperly eliminated 40 per cent of rate case expenses where the question of whether mixed gas could be furnished was a proper subject of controversy and there was no showing of unjustifiable cost of litigation. The

court reversed the disallowance of expenses, observing that the commission had afforded the company no opportunity to present evidence relating to the matter and that the elimination was based on no evidence in the record (44 PUR NS 383).

Financing the Customer's Side of a Rate Case

Obviously the customer's side of a rate case should be adequately presented. In a 1954 decision the Alabama commission noted that a telephone company, in making a case for a rate increase, had employed outstanding experts at large fees, together with outstanding legal talent. The expense was substantial. While the commission did not object to the use of such qualified persons, it observed that the ratepayer, who must pay for the company's presentation, had to rely on the very limited budget of the commission and the unorganized resources of interveners for a presentation of evidence to show that a rate increase was not necessary. "In plain words," said the commission, "this is not right."

The commission went on to say that the ratepayer's side of a case should be thoroughly investigated and should be financed through the rates established, just as the company's presentation is financed. The commission expressed the need for legislative action in Alabama to remedy this inequity, as it has been remedied in other states (4 PUR3d 195).

Review of Current Cases

Independent Commission Rate Investigation Not Required When Company's Evidence Deemed Satisfactory

THE commission is not bound to make an independent investigation in a rate proceeding, the Montana supreme court ruled, even though no other evidence is before it than that submitted by the utility proposing the rates. The Montana commission had approved a rate increase for a gas company on the basis of the company's uncontroverted evidence. The order, challenged by the state, was upheld.

In contending that the commission should have made an investigation of its own before authorizing the increase, the state pointed to a statute authorizing the commission of its own initiative to revalue property. But the court held that the statute was permissive only, so that no revaluation need be made when the proof submitted is deemed satisfactory. Besides, in challenging the order, the state had the burden of proving it was unlawful or unreasonable. The court observed that a rate order cannot be held unreasonable merely because the commission fails to call the members of its staff as witnesses. Furthermore, the court has no authority to nullify the action of the commission for failure to make an independent investigation where the evidence submitted justifies the order.

Supporting Evidence

It was contended that the commission, in determining the value of the utility's property, relied too heavily on the compa-

ny's calculation of evidence of reproduction cost new. This calculation was fixed at nearly $39.2 million in 1952, not counting additions since that year. Evidence showed original cost less depreciation to 1952 of about $17.1 million, and the assessed tax value was approximately $10 million. The commission fixed the fair value as of 1952 at $30 million, later property additions being added. On this amount a rate of return of 5.12 per cent was allowed.

The Montana statutes are silent on the question of how value shall be determined. It has been judicially determined, however, that present value is required and that reproduction cost new less depreciation is an important factor in present value. In making an investigation, the commission may avail itself of pertinent public information. In this proceeding the commission examined public records relating to the utility company's operations over an extended period of years.

The state claimed that the company did not submit requisite information as to its capital costs. It appeared that the commission considered records in its files on the company's securities outstanding, operating expenses, capital expenditures, taxes, and plant accounts. The rate of return, being based on such information, along with other elements, was adequately supported.

The court concluded that on the showing made by the company the commission did not abuse its discretion in granting the rate increase. The commission cannot be held in error, said the court, for ruling according to the only evidence before it. The court noted that the question of reasonableness of rates is never foreclosed, but if they are to be changed, supporting evidence must be submitted. *Montana ex rel. Olson v. Montana Pub. Service Commission et al. 308 P2d 633.*

Electric Company Authorized to Construct and Operate Atomic Power Plant

THE California commission authorized the Pacific Gas and Electric Company to construct, operate, and maintain a nuclear steam-electric generating and transmission project. In proposing this atomic power plant, the company was looking to the future when atomic power might reduce the need for bulky fuels.

While the output from this plant might be comparatively small the company's capital investment was limited. Furthermore, the power at 60 per cent capacity factor would cost no more per unit than that from a large conventional steam plant.

The commission agreed that construction of the atomic power plant should give the company basic experience in atomic power plants that would enable it to construct future full-scale nuclear plants with improved efficiency.

The company planned to finance the construction by using, to the extent available, its working capital, moneys in reserve, funds not required for immediate use, and the proceeds of the issue and sale of such securities as the commission might, upon proper application, authorize for that purpose. The commission believed that the company had the financial means to construct the turbine generator portion of the plant and place it in successful operation and that such energy as might be produced by the plant could be utilized on the company's system.

Proposed Nuclear Plant

It was alleged that the General Electric

Company is carrying on a research program for the development of power generation by atomic energy and, in that connection, was constructing an engineering development center near San Francisco. As a part of that project it was providing a nuclear-fueled boiling water-type reactor. This had been authorized by the Atomic Energy Commission. Applicant's plant was to be located on property leased from General Electric Company. This generating plant and line would be operated and maintained by Pacific Gas and Electric and the steam would be purchased by it from General Electric Company for operation of a steam turbine.

Nobody objected to the application although the city of San Francisco was concerned as to the effect of this plant upon a nearby creek which formed part of the water supply for the city. The California Farm Bureau Federation's counsel and representatives urged the commission to grant the application and stated that the national policy of the farm bureau is that atomic power should be developed by private agencies rather than by federal agencies.

Atomic Power Project Contract

The methods, means, and terms for producing electric energy were to be governed by a 10-year contract between Pacific and the General Electric Company. General Electric would construct the boiling water reactor and furnish steam to Pacific. Pacific would furnish and operate a turbine generator and such other equipment as might be necessary for the generation of electricity from such steam. The contract stated that in addition to the production of electricity the project was intended to enable both companies to obtain experience in the design, construction, and operation of atomic power plants.

The contract placed a ceiling on Pacific's expenditures for electrical generating facilities. General Electric would reimburse it for all necessary expenditures over and above that ceiling. Pacific's cost of power at the switchboard was estimated to be 7 to 8 mills per kilowatt-hour assuming a 60 per cent capacity factor. Such a low cost was possible only because of the assistance to be received from General Electric. Such cost is about the same as for power from a conventional steam plant.

General Electric would supervise the operation and maintenance of the project and provide certain personnel. Pacific would supply the personnel necessary to operate the electrical generating facilities as well as some personnel necessary to operate the boiling water reactor and associated equipment. *Re Pacific Gas & Electric Co. Decision No. 54594, Application No. 38522, February 25, 1957.*

"Acquisition of Control" Results from Merger Of Indirectly Controlled Railroad

THE United States Supreme Court ruled that Alleghany Corporation, a noncarrier already having indirect control of Jeffersonville Bridge & Railroad Company, acquired control of the company, within the meaning of § 5(2)(a)(i) of the Interstate Commerce Act, by way of a merger of Jeffersonville into the "Big Four" Railroad Company. The court also held that common stockholders of Alleghany had sufficient standing to challenge an Interstate Commerce Com-

mission order conferring carrier status upon Alleghany and authorizing it to issue convertible preferred stock for outstanding cumulative preferred. A financial interest was provided by an alleged threatened dilution of these stockholders' equity, and the status order was a source of the threatened injury.

On application by Alleghany and the New York Central Railroad Company, the Interstate Commerce Commission had authorized the merger of Jeffersonville into the Big Four and had also approved continuation of Alleghany's status as a carrier. The Big Four is operated by the New York Central as lessee, which owns nearly all of Big Four's common and preferred stock, and Alleghany controls the New York Central, though that control was never approved by the commission. On appeal by minority common stockholders, the commission's orders were set aside. The high court, on appeal by Alleghany and the New York Central, reversed this judgment, holding that the acquisition of control came within the meaning of § 5(2)(a)(i). The case was remanded to the lower court for consideration of the stockholders' attack on the order authorizing the stock issue.

Section 5(2)(a)(i) provides that a noncarrier having control of one or more carriers may, with the commission's approval, acquire control of another carrier through ownership of stock or otherwise. Section 5(3) provides that such a noncarrier shall be "considered as a carrier."

Discussion of "Control"

Since Alleghany already had indirect control of Jeffersonville, by way of its control over subsidiaries, it was contended that Alleghany could not be considered as acquiring control, within the meaning of § 5, through the authorized merger. The court held that the merger in fact resulted in acquisition of control, pointing out that so long as Jeffersonville existed as a separate entity it would be possible for control to pass to another railroad. This possibility was eliminated by the merger.

The crux of each inquiry to determine whether there has been an acquisition of control within the meaning of § 5(2), said the court, is the nature of the change in relations between the companies whose proposed transaction is before the commission for approval. The issue is not the immediacy or remoteness of the parent from the proposed transaction, but whether the transaction accomplishes a significant increase in the power of one company over another. The court cited, for example, an increased voice in management or operation, or the ability to accomplish financial transactions or operational changes with greater legal ease.

Furthermore, the court said that the finding of the commission that a given transaction does or does not constitute a significant increase in the power of one company over another is not to be overruled where there is warrant in the record for the judgment of the expert body.

On a contention that the commission's jurisdiction failed because two stockholders alleged to dominate Alleghany had not joined in the application, the court observed that the administrative jurisdiction depended not on the action of the parent corporation but on whether its activities fell within § 5(2) and (3) of the act. The commission would not lose jurisdiction over a noncarrier under § 5(2) even if the commission should wrongly decide that the noncarrier is not itself controlled by any person or corporation and that the latter need not join in the noncarrier's application. The commission could not thus be ousted of jurisdiction. *Alleghany Corp. et al. v. Breswick & Co. et al. 1 L ed 2d 726.*

Franchise Eliminates Competition Question in Electric Certificate Proceeding

A UTILITY has no constitutional or inherent right to be protected against competition, nor has a publicly owned utility any advantages, not specifically set forth in the statutes, over any other utility, a Kentucky appellate court declared. The lower court had remanded a commission order granting an electric company a certificate of public convenience and necessity to operate in the city of Paris, Kentucky, requiring the commission to consider the question of need for competition between the company and the municipal electric system which was then serving the city. The company held a franchise from the city authorizing it to operate in direct competition with the municipal utility system.

The appellate court reversed the lower judgment, ruling that the question of competition had been eliminated by the legislative action of the city in authorizing the competition. The order granting the certificate to the company therefore should not have been remanded for consideration of the competition question.

"Demand and Need" for Service

Before a certificate of convenience and necessity is issued, the commission is required by statute to determine whether there is "demand and need for the service sought to be rendered." The commission had found that such demand and need existed and the court sustained this finding. Evidence showed that over a thousand customers, for a period of at least ten years, had needed the service offered by the company. The only question was whether they would continue to need it. The court thought the answer was obvious.

The city contended that its municipal plant was adequate to serve the company's customers. The contention failed, however, since the municipal plant could claim no inherent right to protection against competition. The municipal system has no priority over the privately owned company, said the court. The certificate was properly issued. *Kentucky Pub. Service Commission et al. v. City of Paris, Ky. et al. 299 SW2d 811.*

Unlimited Rover Authority Not Included within "Occasional Service"

THE Colorado commission denied an application of a motor truck common carriers' association, as agent for and on behalf of a call and demand carrier, for authority to publish rates governing certain commodities. In effect, held the commission, the grant would have contravened the original authority and interfered with the authority of scheduled carriers who could perform the service.

The carrier's certificate authorized general cartage in the city of Longmont, Colorado, and in the county of Boulder, and occasional service throughout the state subject to enumerated conditions. The occasional service provision was included to allow reasonable latitude in the carrying on of local business. The granting of unlimited rover authority was not contemplated since it would enable the call and demand carrier to raid the territory of scheduled carriers statewide.

Elimination of Penalty

The applicant had proposed to eliminate a 20 per cent penalty on the commodities

in question, as provided for in the certificate and the commission's rules in instances where call and demand common carriers competed with scheduled line haul carriers either singly or jointly for the movements of class or commodity items. No carrier, held the commission, may extend the provisions of its certificate of convenience and necessity, nor waive commission rules, by the mere filing and publication of a tariff. To allow publication would be in direct contravention to commission decisions and rules governing certificated carriers. *Re Motor Truck Common Carriers' Asso. Case No. 1585, Decision No. 47783, April 22, 1957.*

Petition for Rehearing Condition Precedent To Review

THE United States court of appeals dismissed an appeal from a Federal Communications Commission order in a licensing matter that had been brought by a broadcasting company. The company had not been a party to the commission proceeding and consequently had not raised before the commission its objection that the majority had failed to agree on the order.

The court quoted § 405 of the Communications Act, which provides that the filing of a petition for rehearing is not a condition precedent to judicial review except where the parties seeking review are not parties to the proceedings resulting in the decision order, or requirement, or where such parties rely on questions of fact or law upon which the commission had been afforded no opportunity to pass.

Because the broadcasting company had not raised the point before the commission, the administrative body had had no opportunity to pass upon the question. By statute, the company was required to file a petition for rehearing as a condition precedent to judicial review. Since it had not done so, the appeal was dismissed. *O'Neill Broadcasting Co. v. United States et al. 241 F2d 443.*

Commission Rule Authorizing Limited Notice Held Insufficient under Statute

WHILE the Florida commission has power to provide by rule for the issuance of temporary carrier authority, it may not limit notice of hearing to "all existing certificate holders whose rights might be adversely affected," in view of a statute requiring notice to "all transportation companies serving any part of the route proposed to be served by the applicant." The Florida supreme court thus ruled in a proceeding on motion by the state (on the relation of two railroads) to quash a writ of mandamus issued earlier by the court commanding the commission to cancel an order granting temporary motor carrier authority, or show cause why not, where notice was not given to the railroads serving in the territory involved.

The railroads claimed the right to notice as required by statute. The commission asserted the validity of the notice provision under the rule and maintained that the railroads were not "certificate holders."

The court observed that many situa-

tions could arise requiring immediate temporary action by the commission to protect industry and the public interest. But the notice provision in the rule was held to be narrower than the statutory provision and therefore could not be sustained. The railroads were entitled to reasonable notice of the application for temporary motor carrier authority. Accordingly, the motion to quash the alternative writ was denied. *Florida ex rel. Seaboard Air Line R. Co. et al. v. King et al. 93 So2d 368.*

Railroad Constitutionally Assessed Total Cost of Bridge Without Regard to Benefit

On appeal from a commission order requiring a railroad to construct a county highway bridge over its tracks at its own expense, the New Jersey superior court, affirming the order, ruled that the commission acted constitutionally, regardless of the question of benefit to the railroad. The old bridge had become inadequate because of normal community growth and consequent increase in highway traffic. The impelling reasons for a larger bridge were local safety, convenience, and necessity.

In such circumstances, said the court, the railroad may not complain of total imposition of cost upon it in the exercise of the state's police power. The theory that a state must consider the benefit to the railroad in determining what proportion of expense must be borne by the railroad, it was noted, has been expressly rejected by the United States Supreme Court in a 1953 case (1 PUR3d 414).

The court rejected a contention that a 1947 New Jersey statute required the commission to assess 85 per cent of the cost to the state. The statute was held not to apply in this case. *Borough of Sayreville et al. v. Pennsylvania R. Co. 129 A2d 895.*

Telephone Rates Increased with View to Uniformity With Rates of Comparable Exchanges

Showing a rise in labor costs, together with a sizable loss on its Connecticut operations for 1956, the New York Telephone Company secured the Connecticut commission's approval of a rate increase. The commission noted that, as a result of a recent rate increase in New York, the company's Connecticut rates were lower than those in its New York exchanges having a comparable number of telephones in a local calling area. The commission did not go into the question of rate of return but indicated merely that the rates which it authorized were "no more than just and reasonable."

The increase approved in the instant proceeding placed the rates in the two jurisdictions on a uniform level. Reaffirming its position in an earlier case, the commission indicated that Connecticut and New York rates in comparable exchanges ought not to result in an unrealistic and unjustifiable emphasis on the accident of political boundary.

The method used by the company in allocating its plant and expenses was based on the 1947 Telephone Separations Manual with 1952 and 1956 addenda, published by the National Association of Railroad and Utilities Commissioners.

While the Connecticut commission has not formally adopted the separations procedures prescribed in this manual, it accepted them for the purposes of this proceeding. *Re New York Teleph. Co. Docket No. 9438, April 1, 1957.*

Nondelivery Not Justified by Picket Line

THE United States district court refused to dissolve a mandatory injunction directing two interstate motor common carriers to make deliveries to a consignee. Two labor unions, which did not represent or claim to represent any employees of the carriers or the consignee of merchandise shipped with such carriers, had conducted a peaceful organizational picket line around the consignee's premises which carrier employees were unwilling to cross. This, it was held, did not deprive the court of jurisdiction to issue the injunction.

Congress, pointed out the court, by enactment of the Labor Management Relations Act, did not indicate an intention to overrule its previously expressed intent that persons engaged in the transportation business make delivery to consignees. The mandatory injunction did not require involuntary servitude by the employees of the carriers because it did not require any labor or service by any individual employee. Creating ordinary legal motives for right conduct on the part of a class, as opposed to an individual, said the court, does not create involuntary servitude as those words are used in the Thirteenth Amendment. *Quaker City Motor Parts Co. v. Inter-State Motor Freight System, 148 F Supp 226.*

Denial of Second Motion to Consolidate Upheld

THE United States court of appeals held that the Civil Aeronautics Board had not acted arbitrarily in denying an airline's second motion to consolidate applications for new routes.

The Civil Aeronautics Board had granted the airline's first motion for consolidation with another proceeding because it had found good cause for the motion being filed late.

The second motion, however, had been justifiably denied on the ground that it was not timely filed. Granting the motion would have greatly expanded the geographic scope of the proceeding.

The board had found that intervening airlines would serve the public interest by their proposed operations, whereas petitioner airlines which asked for authority to operate air coach service between large cities would not. The board's denial of the application for new routes found valid and sufficient support in the findings, held the court. *North American Airlines, Inc. et al. v. Civil Aeronautics Board, 241 F2d 445.*

License to Roam Denied Private Motor Carrier

THE Colorado commission refused to enlarge a private motor carrier permit so as to authorize transportation of farm products to all points within the state from a 25-mile base area, except for the transportation of livestock. During the eight-

een years since the original permit had been issued, pointed out the commission, there had been no indication that the authority was narrow or restrictive. During that interval other carriers had made investments in equipment and facilities on the basis of the existing economic condition in the area.

The carrier now sought enlargement of authority so that a redistribution of revenues could be obtained. No shippers had appeared in support of his application. Since there was no change in economic conditions in the area, held the commission, the grant of the requested authority would be at the expense of existing common carriers. The applicant was not a common carrier holding itself out as willing to serve and dedicating its equipment to the service of the general public. Instead, it was a private carrier serving only at its convenience or as the requirements of its voluntary agreements demanded that it serve.

The commission refused to allow encroachment upon the revenues of existing carriers. The granting of the authority would merely give the applicant a license to go out and develop whatever business it could, without any corresponding legal duty to service the public upon demand.

Load Limit Revised

The selection of a load limit of 7,500 pounds for service into and out of the base territory, contained in the present permit, appeared to the commission to have been ill-advised. Neither truck inspectors on the road nor highway patrolmen had scales with which to determine whether the carrier was operating within that authority.

The commission held that the limit should be corrected to some method easily determinable by any enforcement officer who should stop the carrier on the highway. Since protestants had indicated that the applicant's present equipment, a 16-foot bed straight truck, had not affected their operations, the description of the equipment was substituted for the 7,500-pound limitation.

Larger Equipment Denied

The carrier complained that it was not able to do the most efficient job of transporting livestock with present equipment, and for that reason sought authority to have larger equipment. No cause, said the commission, had been shown for allowing the applicant to commence large-scale hauling of livestock or feeds, which would have been possible if larger equipment could be used. The size of present equipment imposed an economic limitation upon the type of transportation that could feasibly be done, and in general have the economic effect of limiting transportation into and out of the territory to small loads. The mere desire to expand operations was not sufficient to warrant granting enlarged authority. *Re Albright, Application No. 14467, Decision No. 47682, April 10, 1957.*

Commission Orders Rural Telephone Company to Furnish Adequate Service

UPON investigation following complaints by subscribers, the Wisconsin commission found that Mason Rural Telephone Company's service was not reasonably adequate. Line facilities were generally in poor condition, additional circuits were needed, and only intracompany calls were possible. Until a year ago

Mason Rural was interconnected with Chequamegon Telephone Co-operative, but when that system was converted to dial operation and Mason Rural failed to arrange for either continued operation on a manual basis or for automatic service, the company's lines were disconnected.

Mason Rural requested authority, however, to install a magneto switchboard with facilities for interconnection, through the automatic equipment of the co-operative's exchange, with the toll center.

Since this would require the use of two of the three available toll circuits for essentially local calls, the commission rejected the proposal as inadequate and contrary to the public interest. The company's rural subscribers should be permitted to call other local stations directly, avoiding excessive use of toll facilities and operators, the commission said.

In order for Mason Rural to provide adequate service, the commission indicated that it would have to provide a means of interexchange service, otherwise improve its facilities, and furnish 24-hour service. Three alternatives were open to the company in solving its switching problem. It could convert to dial service and connect with the co-operative's facilities on a dial switched-line basis; it could sell its facilities to the co-operative; or it could install a manual switchboard with trunk facilities to the automatic equipment of the co-operative, permitting direct calls between the company's rural subscribers and stations in the village of Mason, together with normal toll service. The company was given sixty days in which to submit a plan and commitment to render adequate service.

Service Area

Finally, a dispute between Mason Rural and the co-operative over the right to serve in the village of Mason was decided in favor of the co-operative. The commission found that the co-operative had been serving the village for a long time and could properly continue to do so. Mason Rural was not in fact serving the Mason community, and the commission did not think public convenience required the establishment of a second telephone utility in the village. *Re Mason Rural Teleph. Co. CA-3501, 2-U-4739, 2-U-4740, April 29, 1957.*

Administrative Discretion Not Subject to Review

THE grant or refusal of a motor carrier permit by the commission, held the South Dakota supreme court in upholding a lower court's affirmance of a commission order, is the exercise of an administrative or legislative function and not a judicial power. Judicial action cannot supplant the discretionary authority of that body. Review cannot extend beyond the questions of whether the commission has acted within constitutional or statutory powers and whether its order or determination is supported by substantial evidence and is reasonable and not arbitrary.

The commission had amended certain motor carrier permits to authorize operations in a larger area than permitted by the original grant. In determining the ultimate fact of public convenience and necessity, pointed out the court, the commission is required to give reasonable consideration to the transportation service being furnished by existing transportation agencies and the effect which the proposed transportation service might have

on other forms of service which are essential and indispensable to the communities to be affected.

If public interest requires additional service, it is controlling and other objectives are secondary. The public is entitled to improved motor carrier service, and when there is substantial evidence of the need, priority in the field and the fact that the business of an existing carrier may be affected will not prevent the granting of a permit.

Conflicting Evidence

Applicants had presented a number of witnesses who testified that existing service did not satisfy the need and convenience of shippers to the livestock auctions in the area and that there was a need for the additional service that would be made available by amending the permits extending the areas of operations of applicants. The evidence that had been presented by the protestants related to the sufficiency of equipment available and to the adequacy of the service rendered.

Protestants had claimed that existing facilities were ordinarily sufficient, but had admitted that infrequently they found it necessary to call upon other motor carriers to assist them. They expressed the opinion that the proposed change would create undue competition and that their operations and ability to serve the public would be adversely affected.

In view of the conflicting evidence, held the court, it was unable to say that the commission's order was not supported by substantial evidence. No irregularity in the proceeding had been asserted. The inadequacy of existing service and the need for enlarging the permits to correct, or at least improve, the existing service were administrative problems within the sound discretion of the commission. *Re Dyer, 81 NW2d 884.*

Other Recent Rulings

Rural Rate Schedule. The Wisconsin commission, after authorizing a municipal electric plant to increase rates, directed the establishment of higher rural rates where rural customers had been billed under the same rate that was applicable to urban customers except for an additional 25 cents a month and the cost of serving them was not adequately covered by the small differential. *Re Village of Gresham, 2-U-4747, April 16, 1957.*

Public Convenience Paramount. The New Jersey commission, in denying a railroad's application for permission to discontinue two passenger trains, commented that the requirements of public convenience and necessity are paramount to failure to earn a proper return on the operation, and that statistics on revenues and patronage on the trains, although generally recognized as dependable measures of the extent of use of a service, provide a less dependable gauge to test public convenience and necessity. *Re Pennsylvania R. Co. Docket No. 9562, April 3, 1957.*

Telephone Company Return. The Wisconsin commission considered a return of 6.13 per cent on a telephone company's net book value rate base reasonable. *Re Coloma Teleph. Co. 2-U-4742, March 28, 1957.*

Service Across Picket Line. The Ten-

nessee court of appeals held that a lower court had jurisdiction to issue a mandatory injunction compelling common motor carriers to continue rendering service to a shipper, which the carriers had stopped because their truck drivers refused to cross the union picket line of employees of the shipper's affiliate, which occupied space in the shipper's plant. *Aladdin Industries, Inc. v. Associated Transport, Inc. et al. 298 SW2d 770.*

Maintenance Expense. The Wisconsin commission, allocating 65 per cent of a telephone company's total plant force payroll to current maintenance expense, stated that in a previous proceeding it had considered a 65 per cent allocation conservative but in the current proceeding the company's 80 per cent estimate was too high. *Re Farmers Union Teleph. Co. 2-U-4736, March 25, 1957.*

Extension Rule Deviation. The California commission authorized a natural gas company to carry out the terms of a proposed contract to supply interruptible service to a manufacturing plant and to supply firm gas to dwellings on that company's premises, notwithstanding that the proposed contract constituted a deviation from the extension rule relating to costs, where the customer proposed to pay its share of the cost at a favorable rate of interest and the extension presented an opportunity to the utility to improve its earning position in the area. *Re Southern California Gas Co. Decision No. 54701, Application No. 38703, March 26, 1957.*

Rate Increase with Service Proviso. The Colorado commission authorized a small telephone company in need of additional revenue to increase rates but at the same time directed the company to provide a better maintenance program to improve the quality of service. *Re Blanca Teleph. System, I&S Docket No. 392, Decision No. 47543, March 15, 1957.*

Municipal Water Service Discrimination. The Montana commission held that discrimination against consumers of a municipal water plant existed where the town itself received water service for which it did not pay. *Re Town of Thompson Falls, Docket No. 4497, Order No. 2642, March 5, 1957.*

Consolidated Certificate Hearings. The Texas court of civil appeals held that the fact that the commission had heard 150 applications for certificates, filed by 128 specialized motor carriers at one consolidated hearing, did not show, as a matter of law, that the commission could not have reasonably discharged mandatory administrative duties required by statute in connection with each of the applications, where the applications applied for similar authority and evidence as to the needs for one was relevant as to the needs for others. *Alamo Express, Inc. et al. v. Union City Transfer et al. 298 SW2d 914.*

Tariff Construction Jurisdiction. The United States court of appeals held that the Interstate Commerce Commission had exclusive primary jurisdiction over questions of tariff construction and of the reasonableness of the tariff as applied. *Northwestern Auto Parts Co. v. Chicago, B. & Q. R. Co. 240 F2d 743.*

Right to Hearing. A United States district court ruled that the Interstate Commerce Commission abused its discretion in refusing to waive its time limitation on filing for the reopening of a proceeding, where interested motor carriers were deprived of a hearing in a competitive cer-

tificate proceeding by reason of the applicant's failure to give the required notice, and where the applicant contributed to the carriers' delay in seeking a reopening. *Murphy Motor Freight Lines, Inc. v. United States et al. 148 F Supp 471.*

Zoning and FCC Permit. The United States district court held that a municipality, under its police power, could validly enforce a zoning ordinance to prevent the erection of a 75-foot radio tower by a mobile land station radio operator, without violating due process and equal protection guaranteed by the federal Constitution or placing an undue burden on interstate commerce, even though the operator held a temporary permit from the Federal Communications Commission to operate the station. *Kroeger (Mobile Radio Dispatch Service) v. Stahl, 148 F Supp 403.*

Nonexempt Commodities. The United States district court upheld the Interstate Commerce Commission's finding that certain commodities, of agricultural origin, which had undergone processing and emerged with new identities, with new properties, and with new and different uses than the original principal ingredients, were manufactured products not within the agricultural exemption of the Interstate Commerce Act. *Frozen Food Express v. United States, 148 F Supp 399.*

Telephone Service Extension. The Illinois commission granted the petition of persons residing outside the service area of a telephone company for an order requiring the company to extend service despite the presence of a co-operative and the company's previous refusal to serve unless written release had been obtained from such co-operative, where the co-operative was not subject to commission jurisdiction and the quality of service in lieu of company service was unsatisfactory. *Radcliff v. Illinois Teleph. Co. No. 43537, April 16, 1957.*

Livestock Transportation Rate. The Colorado commission denied an application of a motor truck association, on behalf of its members, for authority to increase livestock rates where only one carrier had appeared at the hearing and offered testimony, which showed that it had been operating at a profit and on an operating ratio of 86.4 per cent. *Re Motor Truck Common Carriers' Asso. Case No. 1585, Decision No. 47574, March 19, 1957.*

Return for Water Utility. The Pennsylvania commission, in separate proceedings, authorized rate increases for two wholly owned subsidiary water companies, affording a rate of return of 5.28 per cent for one company and 5.12 per cent for the other. *Pennsylvania Pub. Utility Commission et al. v. Mount Jewett Water Co. C 16640, C 16637, April 1, 1957; Pennsylvania Pub. Utility Commission v. Hallstead Water Co. C 16641, April 8, 1957.*

Water Company Return. The Wisconsin commission considered a return of 5.5 per cent on a water company's net book value rate base reasonable. *Re City of Horicon, 2-U-4722, March 25, 1957.*

High Water Company Return. The Massachusetts commission did not consider a return of 7.7 per cent on a water company's net investment rate base excessive or unreasonable in view of the comparatively small size of the company and the extent of the additional plant expenditures which the company would soon be required to make. *Re West Stock-*

bridge Water Co. DPU 11891, April 5, 1957.

Uniform Exchange Rates. The Illinois commission modified a telephone company's proposed rate increase so as to produce a return of 3.4 per cent on the fair value rate base, instead of 3.7 per cent under the requested rates, in order to bring the rates of the exchange under consideration in line with rates in effect at the company's comparable exchange, notwithstanding that the commission considered a return of 3.7 per cent moderate. *Re Woodlawn Teleph. Co. No. 43820, March 19, 1957.*

Motor Carrier Operating Ratio. Upon a showing of increased operating expenses and a composite operating ratio of 96.4 per cent, the Washington commission authorized a rate increase for a group of motor freight carriers sufficient to produce a composite operating ratio of 93.9 per cent. *Re Pacific Inland Tariff Bureau, Cause No. T-9271, April 11, 1957.*

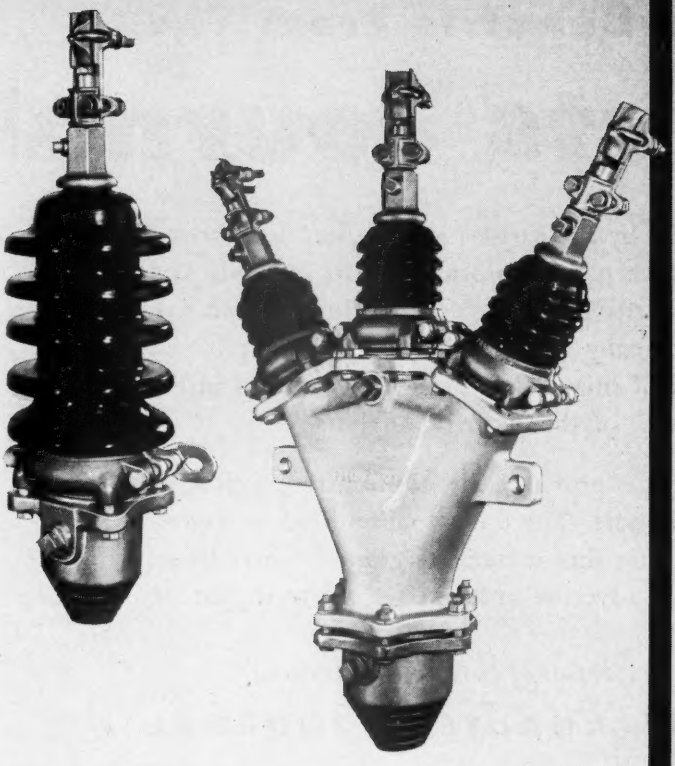
Bus Operating Ratio. The Massachusetts commission approved a rate increase proposed by a bus company for intrastate operations, noting that even with the increase the operating ratio would still be in excess of 97 per cent, affording only a slim margin against unforeseen increases in expenses or decreases in revenues. *Re Vermont Transit Co., Inc. DPU 12069, April 5, 1957.*

Capitalization as Rate Factor. The Connecticut commission, although commenting that it would not consider the necessity of meeting instalment payments on capital raised or borrowed for improving or enlarging a privately owned utility's plant and property in fixing the utility's rates, considered such a factor in granting a rate increase to a municipal water plant where a statutory limitation as to the terms and conditions of raising mortgage capital prevailed and the municipal plant was obligated to service bank loans which had been obtained to finance needed improvements in the system. *Re Portland Water Works, Docket No. 9308, March 28, 1957.*

FPC Jurisdiction. The Federal Power Commission refused to abate hearing and decision on the reasonableness of rate increase proposals pending court action on a petition to review a suspension of the increases, since the commission's action would in no wise interfere with the court's jurisdiction in the review proceeding. *Re Sun Oil Co. Docket Nos. G-9557 et al. April 29, 1957.*

Metered Taxi Fares. The Connecticut commission, in authorizing a taxicab company to increase rates under a zone system, directed the company to prepare, within one year, a schedule based on meter rates, commenting that this is more equitable, particularly in large communities. *Re Greenwich Cab Co., Inc. (Ever-Ready Taxi Service) Docket No. 9446, April 24, 1957.*

Eminent Domain Powers. The Minnesota supreme court held that a co-operative engaged in the business of furnishing electricity at wholesale to member organizations could validly invoke the power of eminent domain because of the ultimate purpose to be served through the benefits of rural electrification. *Dairyland Power Co-operative v. Brennan et al. 82 NW2d 56.*



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"Something Wonderful Happens" the second film released for the Live etter Electrically program.

In 1956, a film entitled "Meet Mrs. venson," was shown by electric utilis to a variety of clubs and civic orinizations in cities from coast to ast.

Production of these motion pictures an important phase of the electrical dustry's Live Better Electrically ogram, a mass-market residential velopment program to boost the use electricity in American homes by phasizing the benefits to be derived om electrical living.

Copies of "Something Wonderful appens" can be obtained from the cal electric utilities who spearhead e Live Better Electrically program their individual service areas.

tomic Energy Documents Made Available to Industry

N line with President Eisenhower's oms-for-peace program, the U. S. tomic Energy Commission has auorized publication of its complete e of declassified information, acrding to Albert Boni, president of e Readex Microprint Corporation, e publishers.

In addition to the A. E. C. documents, the collection will include the full text of material from non-A. E. C. sources except a small percentage for which copyright permission could not be secured. For the first time, the researcher will have at his fingertips the full text of all of the scientific papers represented in the 60,000 abstracts in Nuclear Science Abstracts and its predecessor, Abstracts of Declassified Documents, from July, 1947, to December, 1956, and the approximately 10,000 abstracts published annually after January 1, 1957. It will contain at least four times as much material as is available from any other single source, Mr. Boni said.

The Readex edition will compress the original 2,000,000 pages of some 60,000 documents into about 60 feet of bookshelf space through the use of Microprint, a new process which reproduces 100 original book pages on one side of a 6 x 9 inch card. Unlike all other micro-reproduction processes now in use, Microprint uses printer's carbon ink on high grade permanent-record paper, making possible the economical production of any desired number of copies of an edition.

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The articles in the Readex Microprint edition will be classified under the general headings of biology and medicine, chemistry, engineering mineralology, metallurgy and ceramics, and physics, and subdivided under 88 individual headings in order to meet the varied requirements of research in industrial concerns, universities, libraries, research laboratories, and the needs of engineers, chemists, and medical institutions throughout the world.

Mobile Unit Demonstrates Air Breaker Features to West Coast Utilities

FEDERAL Pacific Electric Company is now bringing "the Mountain to Mohammed" to introduce the company's new type DST air circuit breaker to utility executives and consulting engineers. The breaker is

(*Continued on page 22*)

The Fight Is Only Beginning on Reimbursement for Relocation of Utilities Along the Federal Highways

The vast $52-Billion Federal Highway Act passed last year calls for reimbursement but now the Senate and House is in a mood to change the law entirely. Bills have only recently been introduced to not only amend the Act to cut off all funds for this purpose, but to keep the utilities off the rights-of-way entirely except for crossing.

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transported in an all-weather highway truck for demonstrations in the field, or downtown offices, in western states.

The new air breakers are supplied with five and fifteen kv ratings for continuous 2000 ampere loads. The 15 kv unit will satisfactorily interrupt 500 kva loads. Features of the breaker design include metal cladding for indoor or outdoor service, unusually rugged drawout construction.

Federal Pacific type DST air circuit breakers, originally designed and built in San Francisco, are now being manufactured by the Company's Eastern Switchgear Division at Scranton, Pennsylvania.

Central Pwr. & Lt. Plans to Expand Lon C. Hill Station

CENTRAL Power and Light Company has announced plans for a major expansion of its Lon C. Hill power station near Corpus Christi, which will more than double the generating capability of the plant.

CPL President J. L. Bates said the company will receive bids on the project in July and actual construction work is scheduled to begin in September. The plant addition will cost more than $12,000,000.

The expansion calls for the addition of a 175,000-KW generating unit. The new turbo-generator will be capable of producing more than twice as much electric power as the largest unit in any other CPL power plant.

Generating equipment for the plant addition was ordered in 1956 and preliminary engineering work has been under way since that time. The new plant addition is scheduled to begin operation in early 1959.

This will be the second time that the Lon C. Hill station has been enlarged since it went into service in April, 1954, with an initial generating capability of 75,000-KW. The first expansion was completed in 1956 when a second 75,000-KW unit was placed into service.

Arizona Computer Research Program Studies Electronic Computer Systems

PHOENIX, Arizona, is the headquarters of a specialized research group, unique in the history of the electric and gas utility industries. Known as the Arizona Computer R search Program, the group is exp ing and developing techniques of fectively utilizing an electronic c puter system for the solution of erating and engineering problems.

Member companies of the gr are Arizona Public Service Compa Remington Rand and American Foreign Power Company. Eba Services, Inc. participates in the gram under a separate agreement Public Service. This is believed t the first group effort in the explo tion of operating and engineering u of electronic computers for the b fit of the electric and gas industr

The group organization compri a management committee, a pro director and a research staff of sonnel from the member compan The management committee is c posed of a senior executive and alternate from each of the memb The project director was selected this committee and he is directly countable to them. Each compa furnishes a full-time specialist on research staff. Qualified progra ming personnel are furnished

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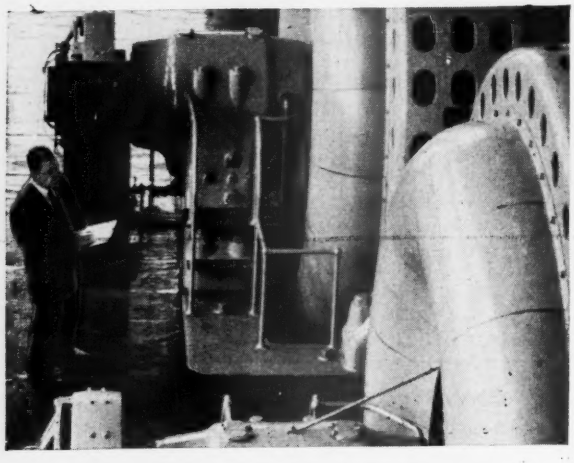

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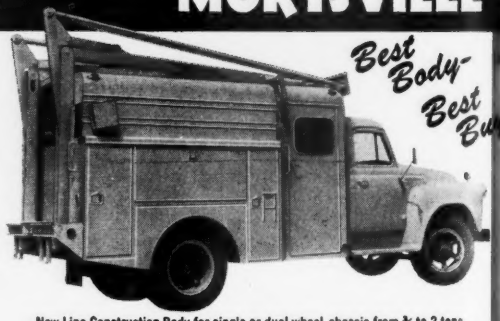

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and Foreign Power; W. C. Filbe
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The representatives met in N
York in July, 1956, to prepare an i
ventory of projects to be submitt
to the management committee for a
proval. Among the seventy-eight pro
ects listed on the inventory are su
jects such as budget forecasts of nu
bers of customers, energy sales a
revenues by Federal Power Comm
sion customer classification, operati
and maintenance expenses, cash flo
requirements, transmission syste
input analyses and load duration cur
development, power flow studies, sy
tem loss formula development, inte
connected systems loss formula d
velopment, economic loading of pow
stations, heat balance and pipe stre
and flexibility problems, analysis a
classification of service interrupti
reports, economic loading of li
transformers, and power system fa
calculations, to mention only a fe
Similar subjects of concern to the g
industry are also included.

Selection of projects for study i
predicated on analyses of budget a
forecasting, and system operating re
quirements influenced by increas
operating and maintenance expense
rising costs of new money for finan
ing, and reduced net incomes after d
preciation and taxes. Research ob
jectively is toward better utilizatio
of available qualified personnel, im
provement in plant facilities due to
more economical planning and design,
and the accumulation of more com
prehensive operating statistics fo
management guidance.

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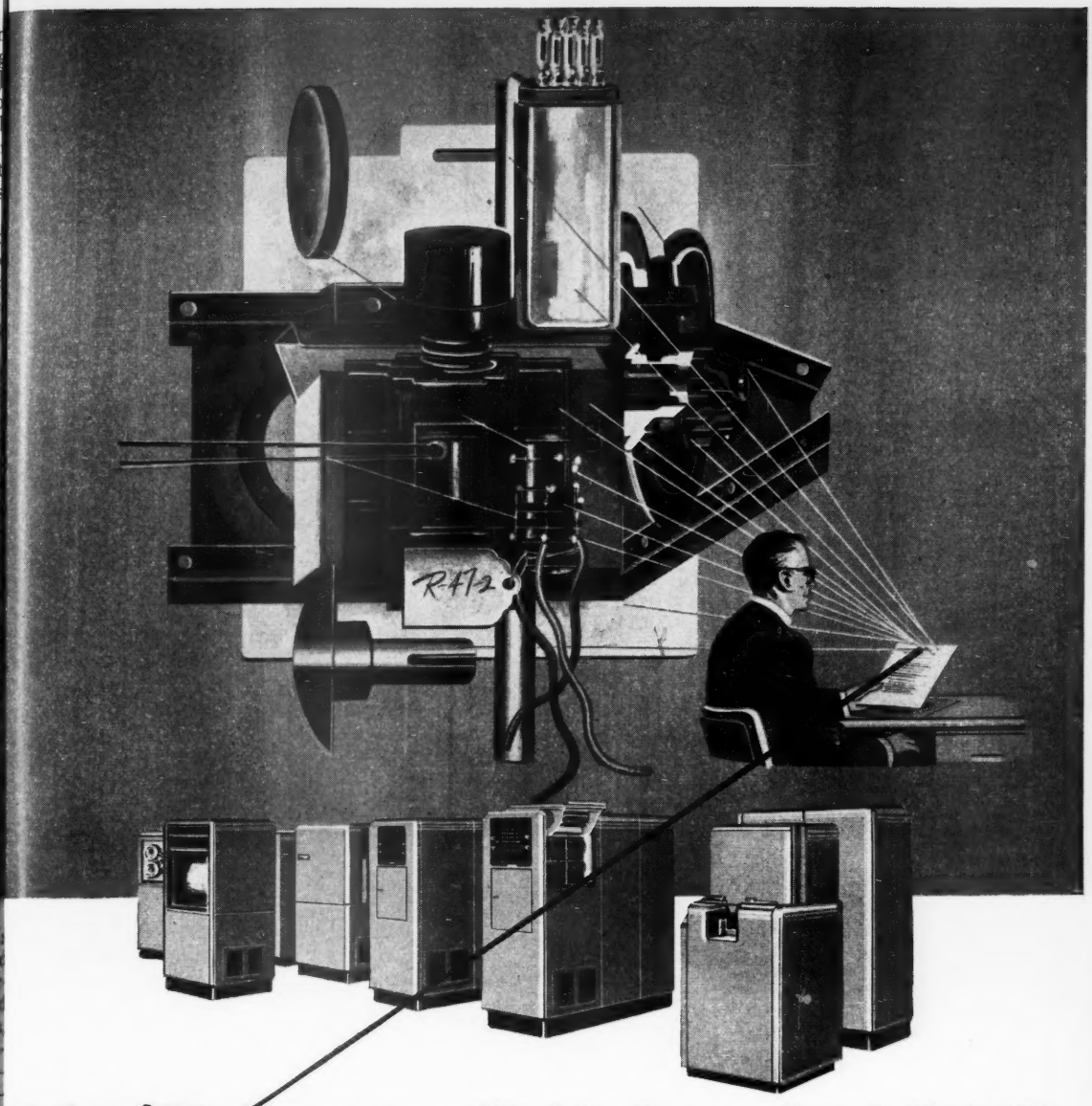
Rand, by arrangement with Public
Service, contracted for computer tim

(*Continued on page* 26)



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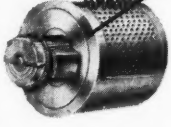

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on a Service Bureau basis. In addition, trained Public Service and Remington Rand computer personnel are available for collaborations with the research staff as work progresses.

Arizona Public Service operates a complex transmission network with purchase or interchange contracts between the Bureau of Reclamation, Arizona Power Authority and Salt River Power District. This complex system provides ideal project data for research study.

Although the agreements authorizing the Research Program were executed in May, 1956, considerable time was required to organize and train personnel. The program is now well organized and considerable progress in problem analysis has been made. This is true particularly in budget forecasting of customers, energy sales and revenues, transmission system input analyses and load duration curve development, power flow study and development of system loss formula.

At the end of the first year of the program, research is well advanced the subjects initially undertaken. Du ing the second year additional subje will be undertaken for study as ti and available personnel permit.

Public Service Electric Puts Ne 225,000 KW Unit in Operatio

PUBLIC Service Electric and G Company put into operation the fi of two 225,000-KW turbine gene tors at its new electric generating s tion in Linden. This station is uniq in that the steam from its generato will serve two purposes; one, to ge erate electricity, and the other to su ply the steam requirements of t Bayway Refinery of the Esso Stan ard Oil Company which is adjace to the station.

Although the turbine generator sign is more complex than the co ventional, it is expected that the s tion will operate at an economy whi will be more than 10 per cent bet than that of most large steam gene ating stations now in service or und construction in the United States, i cluding the supercritical and hig temperature units.

The total cost of the Linden ge erating station with its two init generators and auxiliary electri facilities will be upwards of $10 000,000. The new station will be part of the company's interconnect electric system as well as supplyi the steam and electric requiremen at the Esso Refinery.

Work Started On Dresden Nuclear Plant

MAJOR construction work on Dre den Nuclear Power Station, larges all-nuclear power plant scheduled i the United States, started early thi month, according to Willis Gal chairman of Commonwealth Edison Company. The project is schedule for completion in 1960.

The plant, which is to be owned and operated by Commonwealth Edi son, is being built by General Electri Company for a contract price of $45 000,000. Bechtel Corporation is the constructor-engineer of the project.

Dresden station is being built on a 950-acre site in Grundy county on the Illinois waterway at the point where the Kankakee and Des Plaines rivers meet to form the Illinois river. It will be a 180,000-KW dual-cycle boiling water reactor plant, based on the prin ciple of Argonne National Labora

(*Continued on page* 28)

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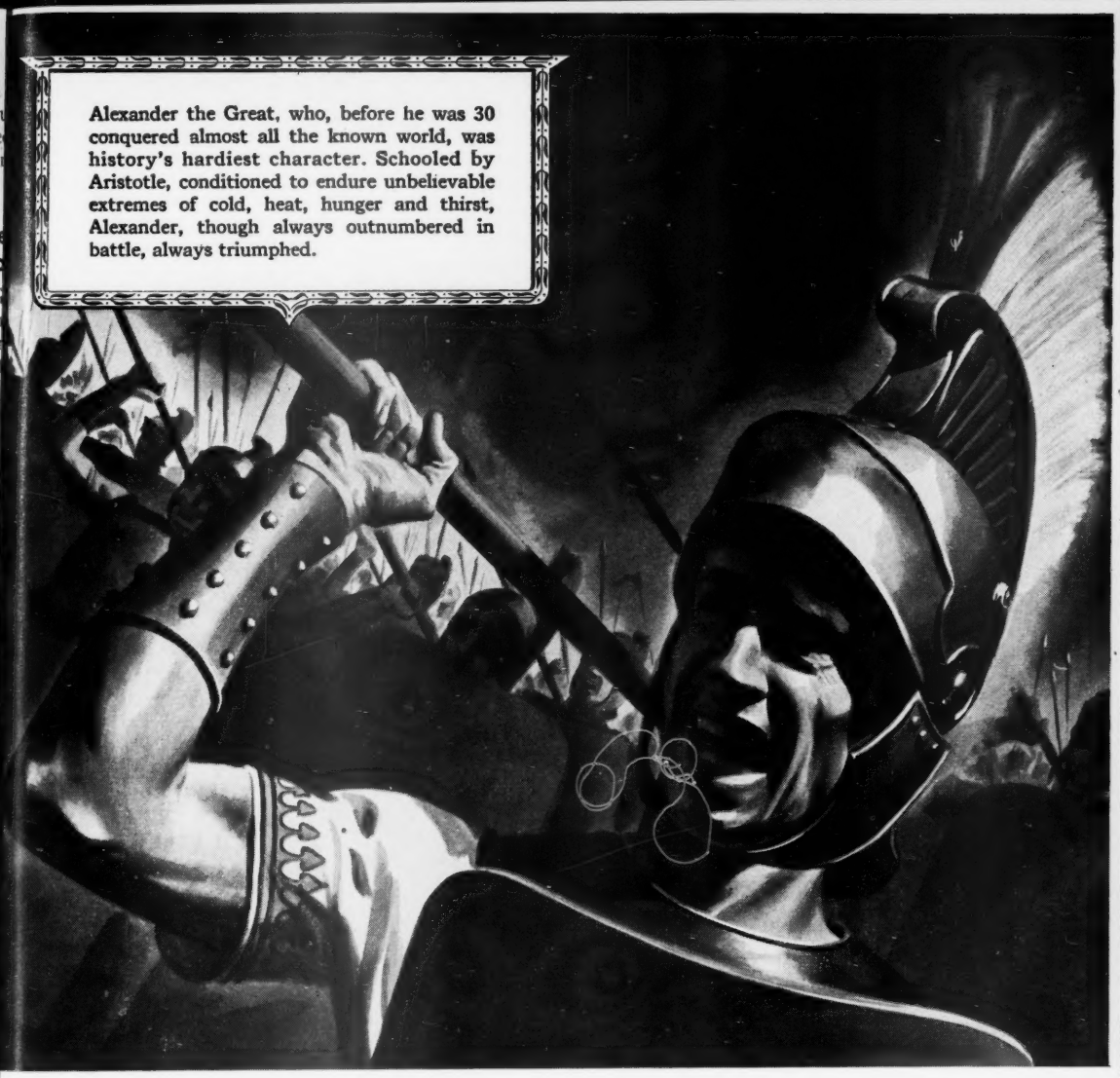
Alexander the Great, who, before he was 30 conquered almost all the known world, was history's hardiest character. Schooled by Aristotle, conditioned to endure unbelievable extremes of cold, heat, hunger and thirst, Alexander, though always outnumbered in battle, always triumphed.

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tory's 5,000-kilowatt Experimental Boiling Water Reactor.

The reactor will be fueled with slightly enriched uranium. The Atomic Energy Commission, in issuing the construction permit for the plant last year, allocated a forty-year supply of fuel. Approximatley 60 tons of nuclear fuel will last as long as six years when full efficiency is achieved. A conventional steam plant of this size would burn more than 3,000,000 tons of coal in six years.

Commonwealth Edison Company will own and operate the Dresden plant. In the Nuclear Power Group, in addition to Commonwealth, are American Gas and Electric Service Corporation, Bechtel Corporation, Central Illinois Light Company, Illinois Power Company, Kansas City Power & Light Company, Pacific Gas and Electric Company and Union Electric Company. The seven utilities in the group represent about one-eighth of the electric generating capacity of the country.

Water-Power Resources of Canada

A RECENT editorial in the Canadian Weekly Bulletin contains a resume of an annual review of the water-power resources of Canada and their development to the end of 1956 which was done by the Water Resources Branch, Department of Northern Affairs and National Resources. The review points out that the water powers of Canada, although only partly developed, have exercised a marked influence on the economic development of the country. The close relationship between water power and industry in Canada is particularly evident in southern Quebec and Ontario which, although lacking in indigenous coal, have become the most highly industrialized regions of the country through the use of their large water power resources. The Province of British Columbia, which is rich in potential water power, also has been making rapid industrial progress coincident with water-power development. These three provinces in particular continue to experience the rapid industrial growth which is evident in varying degree throughout the nation.

From the pronounced activity in hydroelectric construction in Canada during 1956, it is evident that this general trend is continuing vigorously. A total of 845,000 h. p. of new capacity was brought into operation during the year and the construction of additional hydro-electric capacity is being accelerated.

Figures of power available at ordinary-six-months flow which total 57,007,000 h. p. may be said to be conservative as these presently recorded water-power resources of Canada will permit an economic turbine installation of about 74,000,000 h. p. Also, the present total turbine installation of 18,356,148 h. p. indicates the development of less than 25 per cent of the recorded water-power resources of Canada.

Although extensive use of Canada's water-power resources is being made at the present time, large reserves of potential power are still available. It is true in some areas, where the more attractive sites within economic transmission distance of present centers of population already have been developed, that the use of thermal-electric stations is becoming increasingly important. However, remaining reserves of not-too-distant power are sufficient to meet the prospective needs of a considerable part of the more closely settled areas for some years at the very least; also, improvements in the technique of long-distance transmission, including the use of higher voltage, are bringing additional sites within the orbit of existing systems. In more remote districts, water power will facilitate the utilization of mineral and other resources and promote the establishment of new communities; from the viewpoint of moving Canada's frontiers northward, the availability of considerable amounts of potential power in the more northern and at present rather inaccessible regions of the country is a definite advantage.

G-E Bulletin

A NEW light-duty, double-throw safety switch designed to permit the connection of emergency or standby power during storms is described in detail in a new bulletin issued by the Circuit Protective Devices Department of the General Electric Company.

The two-color publication furnishes ratings, dimensions, and application information on the new emergency power transfer switch, and describes fully its special construction features. Also listed are the accessories available for use with the device and ordering directions.

This new publication can be obtained by asking for GEC-1451 from the Circuit Protective Devices Department, General Electric Compa Plainville, Connecticut.

Southern Gas Association Elects New Officers

CURTIS M. Smith, vice president the Tennessee Gas Transmissi Company, was elected president of Southern Gas Association at the state organization's recent conventi in New Orleans.

Mr. Smith is the first representat of an interstate natural gas pipeli company to head the SGA during 49-year history. He succeeded R. Puryear, Jr., president of the A bama Gas Corporation, Birmingha Ala.

The SGA annual meeting was h April 29-30 and May 1, with so 2,000 gas industry representatives tending.

Other new SGA officers inclu Carl E. Cloud of the MidSouth G Company, Little Rock, first vice-pre dent; O. W. Clark of the Southe Natural Gas Company, Birmingha second vice-president; and R. Hinch, of the Nashville Gas Co pany, Nashville, secretary.

Kyle H. Turner of the Atlanta G Light Company, Atlanta, was elected assistant secretary and Willa G. Wiegel of the Lone Star Gas Co pany, Dallas, was renamed treasure

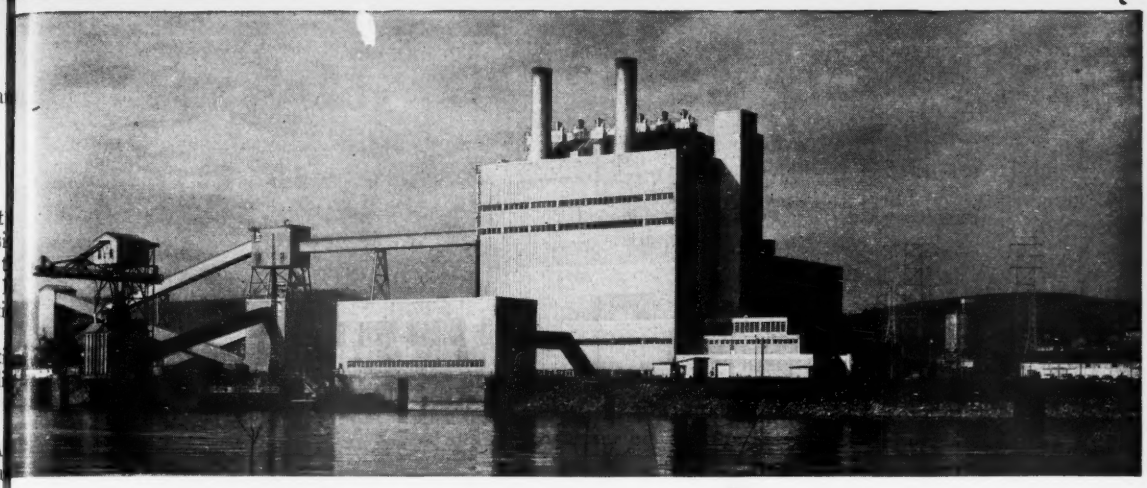
The following were named to t 17-member board of directors: Sc Hughes, Southern Union Gas Co pany, Dallas; George Guler, Minnea olis-Honeywell Company, Atlan Hugh Steen, El Paso Natural G Company, El Paso; H. J. Frilou Norco Gas Company, Norco, La.; S. Whitis, Pioneer Natural Gas Co pany, Amarillo; A. L. Roberts, Tex Gas Transmission Corporation, O ensboro, Ky.; and John Parrott, R noke Gas Company, Roanoke, Va.

James A. Davis, Empire Southe Gas Company, Fort Worth, was ele ed chairman of the association's visory council, and Cecil Webb, Ok homa Natural Gas Company, Tul was named council vice-chairman.

G-E Appointment

GENERAL Electric Company's Co munication Products Departme Syracuse, N. Y., has named Edwin Kenefake as sales manager for Pow Line Carrier Current equipment.

In his new position, Mr. Kenef will be responsible for marketing dio equipment which sends sign along existing power lines of util companies for voice communicati and control functions.



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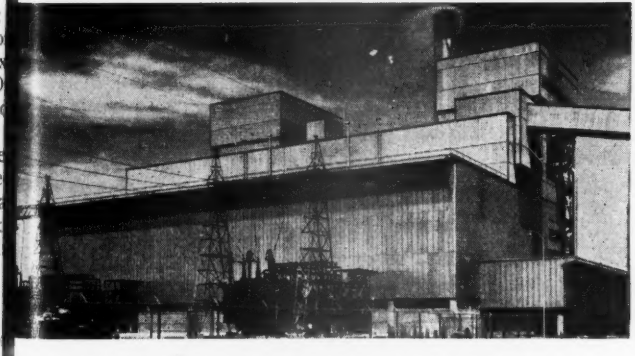
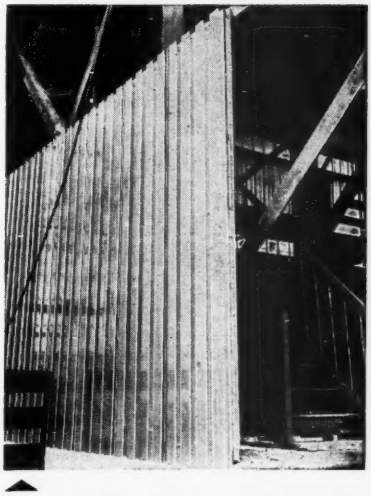


Q-Panel walls grace the new Elrama Power Plant (above) near Pittsburgh. It was designed by Duquesne Light Company's Engineering and Construction Department. The Dravo Corporation was General Contractor.



Q-Panel walls (above) go up quickly in any weather because they are dry and hung in place, not piled up.

More than 32,000 sq. ft. of Q-Panels were used to enclose the impressive Hawthorn Steam Electric Station (left) of the Kansas City, Missouri, Power and Light Company. Ebasco Services, Inc., designed and built the plant.

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A

Abrams Aerial Survey Corporation 33
*Allen & Company .....
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*Amp Incorporated .....
American Appraisal Company, The 22
*American Telephone & Telegraph Company .....
Analysts Journal, The 20

B

Babcock & Wilcox Company, The 4-5
*Bell Helicopter Corp. .....
Black & Veatch, Consulting Engineers 30
*Blyth & Company, Inc. .....
Burns & McDonnell Engineering Company 33

C

Carter, Earl L., Consulting Engineer 33
*Cating Rope Works, Inc. .....
Cleveland Trencher Company, The 24
Columbia Gas System, Inc., The .....Inside Front Cover
*Combustion Engineering, Inc. .....
Commonwealth Associates, Inc. 7
Commonwealth Services, Inc. 7
Consolidated Gas and Service Company 33

D

Day & Zimmermann, Inc., Engineers 30
Delta-Star Electric Division, H. K. Porter Company, Inc. 19
Dodge Division of Chrysler Corp. 9
Drake & Townsend, Inc. 30
*Dresser Industries, Inc. .....

E

*Ebasco Services Incorporated .....
*Electro-Motive Division, General Motors .....

F

*First Boston Corporation, The .....
Ford, Bacon & Davis, Inc., Engineers 30

G

Gannett Fleming Corddry and Carpenter, Inc. 33
General Electric Company .....14-15, Outside Back Cover
Gibbs & Hill, Inc., Consulting Engineers 30
Gilbert Associates, Inc., Engineers 30
Gilman, W. C., & Company, Engineers 31
*Glore, Forgan & Company .....

H

Haberly, Francis S., Consulting Engineers 33
*Halsey, Stuart & Company, Inc. .....
*Harriman, Ripley & Company .....
Highway Publishing Company 21
Hirsch, Gustav, Organizations, Inc. 31
Hoosier Engineering Company 31

I

*International Business Machines Corp. .....
*International Harvester Company, The .....
Irving Trust Company 13

J

Jackson & Moreland, Inc., Engineers 33
Jensen, Bowen & Farrell, Engineers 31
*Justrite Mfg. Company .....

K

*Kellogg, M. W., Company, The .....
Kerite Company, The 27
*Kidder, Peabody & Company .....
*Kuhn Loeb & Company .....
Kuljian Corporation, The 31

L

*Langley, W. C. & Co. .....
Leffler, William S., Engineers Associated 31
*Lehman Brothers .....
*Loeb (Carl M.) Rhodes & Co. .....
Loftus, Peter F., Corporation 33
Lutz & May Company, Consulting Engineers 33

M

Main, Chas. T., Inc., Engineers 31
*McCabe-Powers Auto Body Company .....
Merrill Lynch, Pierce, Fenner & Beane 26
Middle West Service Company 32
Miner and Miner 33
*Morgan Stanley & Company .....
Morysville Body Works, Inc. 22
*Motorola Communications & Electronics, Inc. .....

N

National Association of Railroad & Utilities Commissioners 16
Newport News Shipbuilding & Dry Dock Co. 23
*Nuclear Development Associates, Inc. .....

O

*Osmose Wood Preserving Co. of America, Inc. .....

P

*Pacific Pumps, Inc. .....
*Parkersburg Rig & Reel Company, The .....
Pioneer Service & Engineering Company Inside Back Cover, 32
Pittsburgh Testing Laboratory 33

R

Recording & Statistical Corporation 11
Remington Rand Div. of Sperry Rand Corp. 25
Robertson, H. H., Company 29

S

Sanderson & Porter, Engineers 32
Sargent & Lundy, Engineers 32
Schulman, A. S., Electric Co., Engineers 33
*Smith, Barney & Company ....
*Sprague Meter Company, The .....
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*Westinghouse Electric Corporation .....
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*White, Weld & Co. .....
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Professional Directory 30-33

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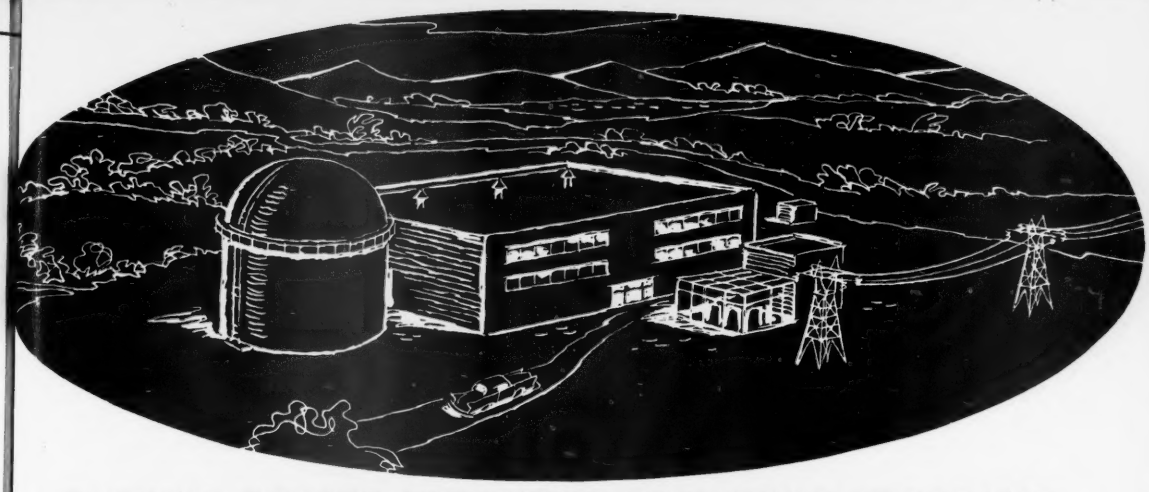

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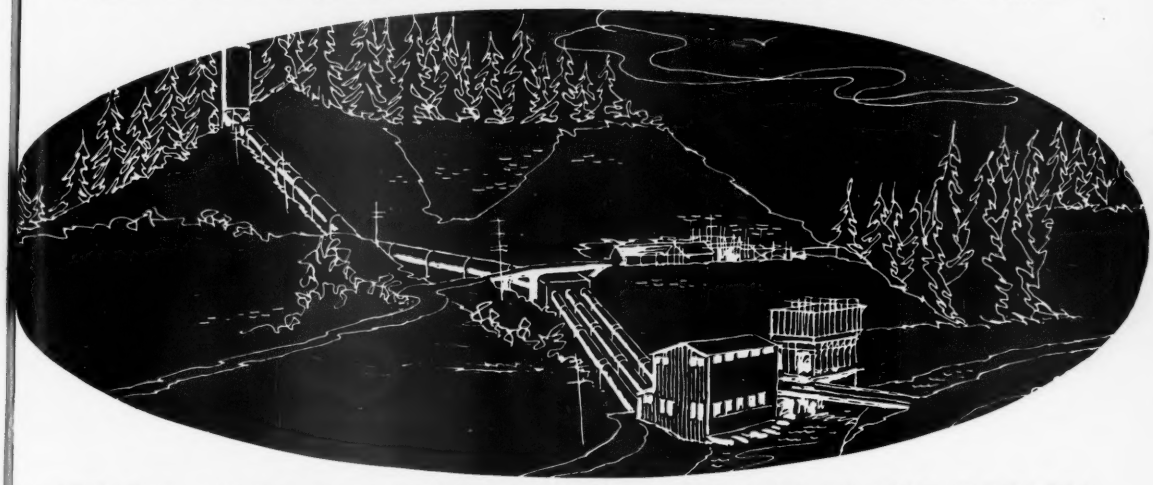

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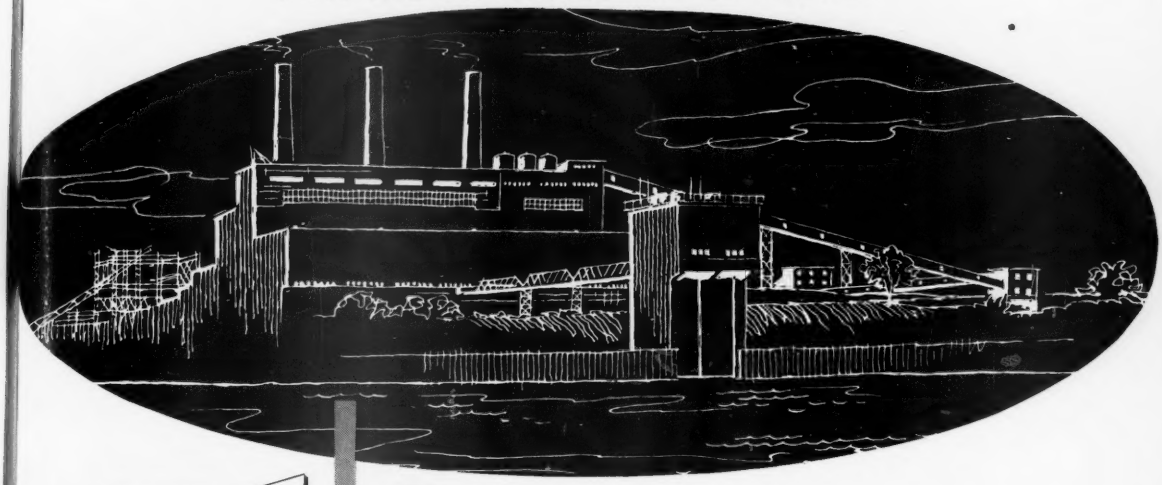

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19.6-DECIBEL REDUCTION is made possible by prefabricated enclosure on this transformer installed at substation site in Schenectady, New York. This 5000-kva, 34.5-kv, oil-filled General Electric medium transformer was designed to meet Niagara Mohawk Power Company's exacting requirements. Here, the outer shell is being lowered into place. Notice sound-absorbing materials in inter-tank space.

Transformer hum in residential substations has long been a problem only partially resolved by the selection of a somewhat isolated site, construction of sound barriers or use of a low-sound transformer. The first two solutions are often impractical or far too costly, leaving the third, which is satisfactory for small reductions in sound.

QUIET TRANSFORMERS

However, a significant development has recently been achieved by General Electric engineers working at the Company's Rome, Georgia Transformer plant. It consists of a transformer in a prefabricated sound enclosure with separately banked radiators. With today's core-and-coil designs, this development enables economical sound reductions of 10 to 20 decibels. This was made possible through the research conducted by transformer development engineers at the General Electric Sound Laboratory at Pittsfield, Mass. Valuable data was also gathered by studying the performance of one-seventh scale models of transformers in the anechoic chamber.

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Traditionally, transformer sound reductions of more than a few decibels has been a utility problem involving costly substation sound barriers. This developmental step forward in reducing transformer hum can change that picture. Utilities are now urged to seriously consider this advantage when confronted with the necessity of installing power transformers in congested residential areas. For more information contact your General Electric Apparatus Sales Office. General Electric Co., Schenectady 5, N.Y.

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